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The Editorial Committee welcomes the submission of manuscripts for possible publication. Two copies, double-spaced, should be sent to the Editor, Almarin Phillips, E-140 Dietrich Hall, University of Pennsylvania, Philadelphia 4.

News and notes should be sent to Dana Barbour, News Editor, American Statistical Association, 1108 16th Street, N.W., Washington 6, D. C.

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Anyone wishing to change his mailing address should allow eight weeks notice. A copy of the address taken from an issue of the periodical should accompany the change-of-address request.

LETTER TO THE EDITOR

March 17, 1955

Dear Sir:

This Association has entered into an agreement with the United States Employment Service to provide liaison activity between the local chapters and the offices of the United States Employment Service in the several states. This is a step in the right direction. However, this program will not operate itself; it is not automatic and it needs to be implemented. Other professional societies have similar arrangements with the United States Employment Service about which little if anything is known to the public. Therefore I recommend that the Association supplement its agreement with the United States Employment Service to the effect that both the Association and the United States Employment Service make provisions for publicity for this program. Not only must the local chapters advise their members that a liaison representative is in their chapter but also the USES must advise the public who they are. Then they must arrange for employer contact representatives of State Employment Services to advise employers of the willingness of the American Statistical Association and its local chapters to help the Employment Service find suitable candidates of statistical competence in the grades necessary to accomplish an employer's particular purpose. Without this program of dual publicity, I see only innocuous desuetude for this program.

Very truly yours,
WILLIAM NETSCHERT, M.E.
Liaison Representative

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NEWS Amendment of By-laws—Conference on Manpower—Publications—Meetings

Amendment of By-Laws on Election of Fellows

The amendment to the By-Laws to permit as many as thirty Fellows to be elected each year was adopted by the Board of Directors and the Council of the ASA at their January 7th meeting in Philadelphia. This amendment had been proposed by the Board of Directors and published in the February 1954 issue of *The American Statistician* as required by the ASA Constitution. No demand for a membership ballot had been received. The effect of the amendment is to change the provision of the Constitution which placed an upper limit of 250 on the total number of Fellows. Recent elections had brought the number near this limit.

Conference on Manpower and Employment

The Social Statistics Section of the American Statistical Association is joining the Bureau of Labor Statistics and the Industrial Commission and University of Wisconsin in sponsoring a Conference on Manpower and Employment to be held at Madison, Wisconsin on July 6–8, 1955. Conference topics will include:

1. Employment Statistics from establishment and household enumeration
2. Measuring the labor force in local areas
3. The Characteristics of the Unemployed
4. Operating a current employment statistics program
5. A program for skilled manpower
6. Manpower aspects of an ageing population
7. The new occupational outlook program
8. Foreseeing States' needs for education and training
9. Industrial Hazards Statistics: Analysis of causes of industrial injuries

Persons interested in attending should write to Mr. Seymour Wolfbein, Chief, Division of Manpower and Employment Statistics, or Mr. Walter Keim, Chief, Division of Field Service, both at the Bureau of Labor Statistics, Washington, D. C. or call them at Executive 3-2420 (government code 177), extension 694 and 92 respectively for further program details and arrangements for attendance.

UN Demographic Yearbook

The 1945 issue of the "Demographic Yearbook" prepared by the Statistical Office of the United Nations, was published in April. This issue, the sixth in the series, contains nearly 600 pages of statistical tables—more than twice as many as the 1953 Yearbook. Many of the series previously published have been amplified and revised, and eight new tables are presented for the first time, including one on married population by age and sex. An explanatory chapter of technical notes on the statistical tables includes discussion of the quality of the data. Following the plan for rotation of the topics included in the Yearbook, the 1954 issue features special tables on natality, including 20 tables dealing with live birth or stillbirth and four showing data on fertility.

Copies of the 1954 "Demographic Yearbook" may be purchased from the International Documents Service, Columbia University Press, 2960 Broadway, New York 27. The price is $6.00 each, paper-bound, or $7.50 cloth-bound.

Statistical and Research Activities of New York City Agencies

The Health and Welfare Council of New York City has recently published "Statistical and Research Activities of Municipal Welfare, Health, and Education Agencies of New York City," a guide to the availability of published and unpublished statistical data and research studies in ten city agencies. The operations of the city government of New York, which in terms of expenditures ranks second only to the Federal Government among governmental units in the country, depend upon, and inevitably produce, large amounts of information in the form of statistical compilations and research studies. Much of this information is of use to other governments, to voluntary health and welfare agencies, to outside research organizations, to business firms and to labor organizations. The present pamphlet is intended as a guide for such agencies and organizations. For each of the agencies covered there is a brief statement about its organization, activities, research program, and current publications. Of particular interest is the comprehensive economic base study of the Department of City Planning, parts of which have already been completed. There is also a directory of the chief research personnel in the agencies included.

Copies of "Statistical and Research Activities of Municipal Welfare, Health, and Education Agencies" may be obtained from the Research Department of the Health and Welfare Council of New York City, 44 E. 23rd St., New York 10, N. Y. The price of the publication is $1.00.

Information Bureau on German Social Sciences

A new Information Bureau for visiting Americans has been established in Hamburg, Germany by the Atlantik-Brücke (Atlantic Bridge), a private organization of industrialists and professional men interested in furthering mutual understanding of the two countries. The Atlantik-Brücke (formerly Transatlantik Brücke) is nonpartisan, and is financed exclusively by the contributions of its members. In the United States it works closely with the American Council on Germany, which is headed by George N. Shuster, President of Hunter College, New York City.

The Information Bureau will give Americans information about German research institutes, universities, libraries, and individual scientists in the field of the social sciences. It is also in a position to arrange contacts with German institutes and scientists and with other experts on economic, social or political questions which the visiting American may wish to study from a practical as well as a strictly scientific point of view. In doing this it will endeavor to direct the visitor so as to enable him to obtain different points of view.

The Executive Director of the Information Bureau on German Social Sciences is Dr. Walter Stahl. The address is Harvestehuderweg 9, Hamburg 13.

Directory of International Standards for Statistics

A Directory of International Standards for Statistics has been published by the Statistical Office of the United Nations as Statistical Papers Series M, No. 22. The Directory refers only to statistical concepts, definitions, methods and classifications established by international conventions, or to regulations and recommendations resulting from the final action of the competent body of an international organization. The recommendations cited refer only to those actually in force. The full texts of the international recommendations are not reproduced, but in each entry the source or sources containing the full authoritative text is given. A list of the names and addresses of the offices from which the publications may be obtained is given in an appendix.

The Directory is organized by subject field, with sections devoted to each of the following subjects—population statistics, vital statistics, health statistics, housing statistics, migration and tourist statistics, agricultural, forestry and fisheries statistics, labor statistics, cost of living and family living studies, national accounts, balance of payments statistics, external trade statistics, industrial statistics, mining statistics, transport statistics, postal statistics, telecommunications statistics, and sampling. It was compiled with the cooperation of the specialized agencies and inter-governmental organizations, at the request of the Statistical Commission at its seventh session, in 1953. At its eighth session, in April 1954, the Commission recommended that the list be kept up to date and circulated to national statistical offices.

Copies of the Directory may be purchased from sales agents for United Nations publications—in the United States, at 20 cents a copy, from International Documents Service, Columbia University Press, 2960 Broadway, New York 27, N. Y.

Expansion of *Economic Abstracts*

Economic Abstracts, a digest of periodical literature in economics and business begun in 1952, has expanded until it now covers fifty economic and business journals. *Economic Abstracts*, which is published by New York University's Graduate School of Arts and Science, has two objectives: it is designed to provide, on a modest scale, what economists have been missing since cessation of the publication of *Social Science Abstracts*; and it offers to graduate students in American universities an opportunity to have their writings published as well as introducing them to the current thinking of economists. Each issue contains a minimum of 200 abstracts of about 200 words each, summarizing the essential features of an article in a professional journal, free from evaluations, as well as a table of contents and subject index. Subjects covered include economic theory, economic history, statistics and econometrics, economic systems-planning and reform, national income, business fluctuations, prices, money and banking, and many more.

Economic Abstracts is published six times a year. The subscription price is $6.00 per year. Persons interested should write to Professor Otto H. Ehrlich, Editor, South Building, New York University, Washington Square, New York 3, New York.

Meeting of Association for Computing Machinery

The 1955 annual general meeting of the Association for Computing Machinery—the only one to be held during the year—will take place at the Moore School of Electrical Engineering, University of Pennsylvania, September 14–16, inclusive.

The Association for Computing Machinery meetings include a variety of topics on the development of computing systems, their application to statistical, mathematical, scientific, and business problems, the design and engineering of components, and the performance of equipment.

The list of topics to be covered at the September meetings include: Statistical Applications; Data Processing Technique; Business Applications of Computers; Computation in Social Research; Sorting Methods; Linear Programming Applications; Advanced Programming Techniques; Digital Computer Component Development.

Requests for programs for these sessions should be addressed to: Association for Computing Machinery, 2 East Sixty-Third Street, New York 21, New York.

Summer Session at University of Michigan

During the Summer Session of 1955, June 20–August 12, the University of Michigan in Ann Arbor will offer a variety of programs and courses of interest to statisticians and students of mathematical statistics. The Department of Mathematics will present a number of elementary and advanced courses and seminars on theoretical statistics, probability, finite differences, and game theory. These courses will be under the direction of Professors A. H. Copeland, Sr., C. C. Craig, P. S. Dwyer, C. J. Nesbitt, and Dr. Clarke. A number of courses in applied statistics and statistical methods will also be given under the auspices of the Departments of Mathematics, Economics, Sociology, Psychology, and the School of Business Administration.

In addition to the preceding courses, a number of special programs in allied fields will be offered. Among these are the Program in Survey Research Techniques, July 18–August 12, the Summer Institute in Mathematics for Social Scientists, June 20–August 12, the Program on Digital Computers and Data Processors, August 1–12 and the Program on Quality Control, August 17–27.

Inquiries regarding courses in Statistics should be directed to Professor C. C. Craig, Department of Mathematics, and inquiries regarding the allied programs should be addressed to the Office of the Summer Session, 3510 Administration Building, Ann Arbor, Michigan.

Statistical Publications Wanted

The School of Law and Economics in Tel Aviv, Israel asks for donations of books for its library in the fields of statistics and economics—primarily textbooks, manuals and research studies of *recent* publication for the use of students. The books should be sent to Dr. Walter Eisenberg, Director, Teamsters' Research Bureau, 265 W. 14th Street, New York City, who will ship them to Israel.

FEDERAL STATISTICAL ACTIVITIES

Present Subcommittees of Joint Economic Committee

The following subcommittees have been established by the Joint Committee on the Economic Report for work in areas which it considers especially worthy of early investigation, in its continuing study of economic matters:

Subcommittee on Economic Statistics—Rep. Richard Bolling (chairman), Sen. John Sparkman, Rep. Henry O. Talle. This subcommittee was established last year to provide leadership for activities of the Joint Economic Committee and its staff concerned with the adequacy and accuracy of economic data. Among the problems with which it will be concerned this year are: the progress and final recommendations of the task forces organized by Federal Reserve to appraise statistics on inventories, savings, and consumer and business expectations; continuing review and improvement of *Economic Indicators* and issuance of a revised Historical and Descriptive Supplement; efforts now being made by executive agencies to improve the quality of unemployment statistics; and the possibilities of obtaining improved information on the shifting incidence of unemployment and underemployment.

Subcommittee on Low-Income Families—Sen. John Sparkman (chairman), Rep. Augustine B. Kelley, Sen. Ralph E. Flanders. This subcommittee, which was active during the 81st and 82nd Congresses, has been reconstituted to spearhead study of the broad problems of low-income families, and ways and means of improving their productive capacity and levels of living.

Subcommittee on Economic Stabilization—Rep. Wright Patman (chairman), Rep. Augustine B. Kelley, Sen. Joseph C. O'Mahoney, Rep. Jesse P. Wolcott, Sen. Arthur V. Watkins. This subcommittee, established last year, is being continued to facilitate study of matters relating to the long-run stability and growth of our economy; be on the lookout for possible trouble spots such as unhealthy inventory trends, commodity speculation, excessive debt accumulation, the corporate stock market, and similar developments; and supervise the Joint Committee staff in studying increasing industrial productivity and bringing together available information on productivity trends and ways in which gains from continuing productivity increases may best be distributed throughout the economy under our free enterprise system. In this connection the subcommittee will keep in close touch with private studies being made of the impact of automation on the long-run employment and supply potentials.

Subcommittee on Foreign Economic Policy—Sen. Paul H. Douglas (chairman), Sen. J. William Fulbright, Rep. Richard Bolling, Sen. Ralph E. Flanders, Rep. Henry O. Talle. This is a new subcommittee, established to appraise the basic theories of foreign trade as they pertain to the position of the United States in the world economy. It will attempt to determine the nature and the source of the comparative advantages enjoyed by the major participants in international markets and the impact of their trade policies on the overall trading position of the United States and on the condition of our major industries. This appraisal of foreign trade theory will provide the basis for considering the feasibility of setting up broad criteria for use in developing an effective international economic policy and in evaluating specific proposals in the field of foreign trade. In the course of this study the subcommittee will review the adequacy of the present statistics dealing with international economic activity, and its recommendations in this respect will be incorporated in the work of the Subcommittee on Economic Statistics.

Subcommittee on Tax Policy—Rep. Wilbur D. Mills (chairman), Sen. Paul H. Douglas, Sen. Joseph C. O'Mahoney, Sen. Barry Goldwater, Rep. Thomas B. Curtis. This is also a new subcommittee, established to examine such questions as whether recent changes in Federal tax law may be expected significantly to improve the distribution of tax burdens among individuals, contribute to the orderly growth of the economy, and make the Federal tax system a more effective fiscal instrument for counterbalancing disruptive movements in the business cycle.

JOHN W. LEHMAN, *Clerk,*
Joint Committee on the Economic Report,
U. S. Congress

National Food Consumption Survey by Department of Agriculture

The Agricultural Research Service and the Agricultural Marketing Service of the U. S. Department of Agriculture are cooperating in sponsoring a national probability sample survey of food consumption in households during the Spring of 1955. The survey, to include approximately 6,000 households, is being conducted by National Analysts, Inc., a private marketing research firm working under contract with the Department.

Data are being obtained by personal interview from the sample of "housekeeping households" (those in which one member has at least ten meals at home during the survey week) on the quantities of all food items consumed during the seven days preceding the interview. Information is also being collected on items, such as income and family characteristics, needed for the analysis of these data. Additional data include prices paid for purchased food; the extent of freezing facilities; the amounts of food produced at home, canned and frozen in 1954 for household use; and home baking practices. The sample was designed so that separate tabulations can be made of urban, rural nonfarm, and rural-farm households, classified by family income in four geographic regions. To assure adequate farm coverage the sample was designed to include, in addition to a basic cross-section of 4,600 households, a supplemental sample of about 1,400 farm-operator families.

The data will permit estimates of the nutritive content of diets and will show the extent to which food supplies meet recommendations of nutritionists. Information on current food consumption patterns and practices with respect to home food production, preservation, and use of foods in ready-to-cook or ready-to-eat forms will be used in the construction of family food budgets and in other consumer education materials. The findings will assist market analysts in finding areas of substandard consumption, and in relating typical consumer reactions to changes in economic factors such as income, and thus in determining whether the market for food may be so constituted that direct efforts may be taken to stimulate consumption among certain groups. Information on quantities consumed that were purchased and expenditures for specific food items and their importance in the total food budget of farm-operator families will provide the basis for

revised weights for the food section of the Index of Prices Paid by Farmers. (Present weights are based on data from 1935–36 and 1942 surveys.)

The collection phase of the survey is being completed in June. It will take several months to process and analyze the survey data. Preliminary plans call for publication of the survey data as averages of individual food items consumed per household, by the four Census regions and urbanization groups (for example, Northeast urban, North Central rural farm, etc.) early in 1956.

Periodic examinations of the food and nutrition situation have long been recognized by nutritionists, market analysts and home economists as vital to a national food and nutrition program. In 1936 and 1942 nationwide surveys of rural and urban food consumption were made. In 1948 a nationwide survey of urban families only was made. A survey of food consumption of farm families in selected locations in the South was made in 1948, and a survey of rural farm and nonfarm families in North Central States was made in 1952.

J. Richard Grant,
Acting Statistical Clearance Officer,
Agricultural Marketing Service,
Department of Agriculture

"Statistics of Income" Reports—1951 and 1952

Additional reports have been issued in recent months by the Internal Revenue Service, in its accelerated publication program for the Preliminary and Complete Reports in its "Statistics of Income" series. For Part 1 (individual and fiduciary income tax returns), the Complete Report for 1951 was issued in March and the Preliminary Report for 1952 in April. For Part 2 (corporation income tax returns), the Complete Report for 1951 was issued in January and the Preliminary Report for 1952 in February. These publication dates represented a further improvement of several months over the publication dates for corresponding reports for previous years.

In all the reports, data are presented in a new format, with greatly improved legibility. For the Part 2 reports, changes in content have also been introduced. The Complete Report for 1951 for the first time used a probability sample as the basis of the corporation statistics. In the Preliminary Report for 1952, Part 2, two current-year tables present all significant financial items, including assets and liabilities, for 65 major industrial groups.

Copies of the "Statistics of Income" reports may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. at the following prices: Complete Reports for 1951—$1.25 for Part 1 and $1.50 for Part 2; Preliminary Reports for 1952—20 cents for Part 1 and 25 cents for Part 2.

Helen F. Demond, *Chief,*
Statistics of Income Section,
Statistics Division, Internal Revenue Service,
Department of the Treasury

Tabulation and Publication Plans for 1954 Census of Manufactures

The Bureau of the Census has announced the tabulation and publication plans for the 1954 Census of Manufactures, including a number of changes in content and manner of presentation from the reports which were presented on the 1947 Census. In developing the plans, careful consideration was given to recommendations which have been made by various groups, such as the Intensive Review Committee in its appraisal last year of Census Bureau programs and more recently by the Committe on the Census of Manufactures of the Budget Bureau's business Advisory Council on Federal Reports. Other factors which had to be considered were the lack of time for detailed planning of new inquiries for the 1954 Census, and the practical limitations imposed by the smaller budget available for the 1954 Census as compared with that for 1947.

The principal changes from the 1947 tabulations will provide: (1) substantial expansion of data on consumption of materials and components, industrial use of water, and installed power equipment; (2) some expansion of data on the output of individual products; (3) more specific data on processes employed in metal fabricating, and (4) more extensive tabulations of industrially classified establishment data, such as those in the Industry volumes. In addition, the industry tabulations will be accompanied by more extensive explanatory materials.

A statement describing in detail the principal innovations planned for the published volumes on the 1954 Census of Manufactures may be obtained from Maxwell R. Conklin, Chief, Industry Division, Bureau of the Census, Washington 25, D. C.

Howard C. Grieves, *Assistant Director*
Bureau of the Census,
Department of Commerce

SEC Survey of Corporate Pension Funds

The Securities and Exchange Commission has initiated an annual survey of corporate pension funds in an effort to supply needed information in this field. The survey was conducted by mail and covered all corporations, except railroads, registered with the Commission. It is believed that these corporations account for the major portion of funded noninsured, corporate pension plans.

The survey questionnaire (SEC Form R-4) requests information on the various types of assets held in pension funds administered by trustees other than insurance companies, and data on income, expenditures and common stock transactions of the funds. The information on stock transactions will be used to measure the impact of pension funds on the stock market. The report form covers each of the years 1951 through 1954, making possible comparisons with the Internal Revenue data for 1951 and the Fortune Magazine estimates for 1952. Universe estimates will be prepared on the basis of the employer-contribution figures for each year.

Results of the survey will make possible, for the first time, publication of a regular series on the assets, income, and stock transactions of corporate pension funds. In addition, SEC plans to use the data to improve its study of the volume and composition of individuals' saving. At present saving in the form of corporate pension funds is not segregated from other forms, and the new series will make possible a better and more useful allocation of saving by type.

It is expected that results of the survey will be available from SEC in July. In addition to aggregates the release will include distribution data on types of pension plans and types of investments.

Vito Natrella, *Chief,*
Section of Financial Analysis,
Securities and Exchange Commission

MEYER ABRAHAM GIRSHICK, 1908-1955

To the thousands of statisticians, mathematicians and econometricians both in this country and abroad who knew Meyer Abraham Girshick, the news of his death on March 2, 1955 brought a keen sense of personal loss. For though historians may some day recall only his contributions to mathematical statistical techniques and to the foundations of the theory of statistical decision-making, those who came into personal contact with him will remember him as a true human among the intellectual giants. Blessed by the ability to work with others and to inspire them by his boundless enthusiasm and by the sincerity of his interest, he has influenced the development of statisticians as well as statistics to an extent which can scarcely be estimated from the mere catalog of his technical publications.

Professor Girshick's capacity for working hard in a relaxed fashion was developed by long practice. Born in a small Russian village near the Polish border on July 25, 1908, he received no formal education until he arrived in New York at the age of 15. Yet by 1934 he was a Carnegie Foundation scholar in the graduate school of Columbia University, working under Professor Harold Hotelling. He lost no time in testing his hard-won knowledge of modern statistical method by applying it to practical problems and by explaining it, not to college students but to practicing statisticians in the United States Government. When he left Columbia University in 1937 he embarked on the design and analysis of a pioneer study of body measurements of 147,000 American children, undertaken by the Bureau of Home Economics of the United States Department of Agriculture for the purpose of helping manufacturers of children's clothing develop an improved system of sizing garments. At the same time he began a series of evening courses in multivariate statistical analysis at the Department of Agriculture Graduate School. Through these courses, extending over a period of ten years when modern statistics was still relatively little known to the public, he attracted many mathematicians and economists to the field, and played a crucial part in convincing administrators as well as statisticians in the Federal Government of the potential value of sound statistical methods.

From 1939 to 1944 he served as Principal Statistician in the Bureau of Agricultural Economics, a position which he left to join the Statistical Research Group at Columbia University where Wald and others were then developing the basic ideas of sequential analysis in a form applicable to the war-time inspection of defense material. Here he quickly became an outstanding member of the research team. In addition to his co-authorship of the widely used Statistical Research Group Report: "Sequential Analysis of Statistical Data, Applications," (1945) he published a number of significant new theoretical results in his papers entitled "Contributions to the Theory of Sequential Analysis" (1946) and collaborated with other statisticians in an important series of papers on sequential estimation in 1946 and 1947.

After 15 months with the Statistical Research Group he returned to the Bureau of Agricultural Economics, and then transferred for the first six months of 1947 to the United States Bureau of the Census, where he adapted sequential sampling techniques to the control of quality of mass clerical operations. As one who worked with him on this project, it is my belief that it was at this point that he began to see how the consideration of various a priori distributions of unknown parameter values (a subject which had fallen into quite thorough disrepute at that stage of the development of modern statistics) could be helpful in the design of statistical tests. In any event his interest now turned to the possibility of approaching such problems from the standpoint of the theory of games.

Upon completion of his work at the Bureau of the Census he spent a little more than a year at the RAND Corporation, developing these ideas. Then in September 1948 he joined the faculty of Stanford University as Professor of Statistics. The years at Stanford were happy and fruitful for him. He immediately became the center of a controlled frenzy of activity. He thoroughly enjoyed every development which made statistics more useful or more easily understandable, whether this development was the result of his own work or the work of one of his colleagues or students. He served as president of the Institute of Mathematical Statistics and carried on the heavy correspondence connected with the duties of that office without ever slackening in his work of teaching statistics at the University, directing the applied and basic research projects in which the Statistical Laboratory was engaged for the Office of Naval Research, and formulating and polishing in animated discussion with all who would listen the basic ideas which ultimately took shape, with David Blackwell's help, in the recently published book, "Theory of Games and Statistical Decisions." He was also a Fellow of the American Statistical Association.

Much of his work on invariant decision procedures remains to be published. His research on the theory of prediction was just beginning when he was so tragically stricken at the peak of his career. His death leaves an aching void in the statistical world that will not soon be filled.

JOSEPH F. DALY

DIFFUSION INDEXES

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In a recent issue of the *American Statistician*, Geoffrey H. Moore describes two approaches to economic forecasting currently being investigated at the National Bureau of Economic Research.[1] One approach is based on an exhaustive investigation of timing relations among economic series, for the purpose of identifying series which in their cyclical turns usually lead, coincide with, or lag general cyclical swings. The hypothesis is that on a current basis the leading group of series may be used to signal coming cyclical turns, subject to confirmation or refutation during and after the event by the coinciding and lagging groups.

The second approach involves "diffusion indexes," or proportions of selected time series that are expanding. The thought perhaps most basic to this approach is expressed in the Thirty-third Annual Report (1953) of the National Bureau, which states: "Recently, we have laid plans for exploring how one of the firmest and most important of the Bureau's findings about the business cycle might be put to current use; namely, that the cycle in aggregate activity has been invariably preceded by a remarkably regular cycle in the proportion of individual activities undergoing expansion."

A body of literature on diffusion indexes is gradually being built up in the publications of the National Bureau and its staff, and a body of diffusion indexes is also being accumulated by the Bureau, relating to different sets of time series, employing different definitions of "expanding" series, and covering different periods.[2] In general, the Bureau sees a number of possible uses for such information as diffusion indexes provide on changes in the "scope" of cyclical expansions and contractions. These indexes may throw light on the sequential and cumulative aspects of cyclical developments, and they may be useful in the construction of business cycle theories. Currently they may contribute to "a keener awareness of the economic state of the nation" and to the proper timing of anti-cyclical measures.

While any direct contributions diffusion indexes may make to current economic diagnosis and policy action would seem to rest to an important degree on their prognostic merits, specific statements about the possible predictive values of such measures are heavily qualified. However, the Bureau does note the possibility that diffusion indexes may be useful for predicting turning points in general business, and for predicting the eventual depth of a contraction shortly after its onset.

This article will discuss briefly the nature and significance of the Bureau's findings so far on diffusion indexes, mainly in terms of their potentialities for forecasting.

I. Types of Diffusion Indexes

Since diffusion indexes are simply proportions of "expanding series" out of a given set they can be calculated for any set of time series whatsoever. The measures the Bureau has calculated for various sets of series are of two broad types, which differ in the definition given to "expanding" series, and which may be distinguished by the terms "historical" and "current." For the historical indexes—those with the "remarkably regular cycle"—definitions are given to expansion and contraction that depend on the identification of specific cycles in individual series and the dating of turning points—cyclical peaks and troughs. (Such dates for a hypothetical series are indicated in the top panel of Chart I,

NOTE: The author is an economist in the Division of Research and Statistics, Board of Governors of the Federal Reserve System. He is indebted to a number of his colleagues in the Division and to Geoffrey H. Moore for helpful comments. The views expressed are his own, and not necessarily those of the Board of Governors or of the persons commenting.

[1] Geoffrey H. Moore, "Analyzing Business Cycles," the *American Statistician*, April–May 1954, pp. 13-19.

[2] In addition to the Bureau's Thirty-third Annual Report and the *American Statistician* article mentioned in the footnote above, which is a version of an earlier article by the same title and author in *Dun's Review and Modern Industry* for October 1953, diffusion indexes are also discussed—although not always by that name—in a number of other publications. These include the Bureau's Twenty-sixth and Thirtieth Annual Reports (1946 and 1950); Occasional Papers 31 (Moore, "Statistical Indicators of Revivals and Recessions") and 32 (Thor Hultgren, "Cyclical Diversities in the Fortunes of Industrial Corporations"); an article by Moore, "Economic Indicators and the Economic Outlook," in the January 1955 *Michigan Business Review;* and an article by Moore, "The Diffusion of Business Cycles," in *Economics and the Public Interest*, Robert A. Solo, Editor, Rutgers University Press, New Brunswick, N. J., 1955. The three Annual Reports mentioned are reprinted in Arthur F. Burns, *The Frontiers of Economic Knowledge*, Princeton University Press, Princeton, N. J., 1954.

to be discussed later.) The only information used is the set of turning point dates for each series; in effect, all other fluctuations are smoothed out. A series is recorded as expanding in all periods between points of trough and peak, and as contracting between points of peak and trough. Because peaks and troughs can be dated only by hindsight historical diffusion indexes can be calculated only for back periods.

Among the historical indexes is one called the "all-inclusive sample" which covers the period 1919–1939 and is based on between six and seven hundred time series. This index is presented in the Thirtieth Annual Report and republished in various places, including the *American Statistician* article. The series used are all of those in the Bureau's large and heterogeneous collection except series with little or extreme fluctuation, those covering short periods, and those in a few other exceptional categories. In Occasional Paper 31 Moore presents another index of the historical type for 1885–1940 based only on series with "acceptable conformity" to the Bureau's "reference cycles," and varying in number from 83 to 356 in different segments of the period. Other historical indexes are based on "poorly-conforming" series, on selected "leading," "lagging," and "coincident" series, on a combination of all three, and on series relating exclusively to one economic variable, such as production, employment, payrolls, wholesale prices, corporate profits, and new orders.

Current diffusion indexes, for which "expanding" series are defined in various ways not requiring hindsight, have been calculated for a "cross-section" of 153 series drawn from diverse fields, for a number of the sets of series relating to one variable such as production and employment, and for other combinations of series. In the case of employment, separate current diffusion indexes are calculated for various industrial subdivisions, such as manufacturing, mining, and trade, with the underlying series distinguished alternatively by industry and by state.

II. Diffusion Indexes and Aggregates

There is an important, if elementary, idea underlying the calculation of diffusion indexes. In discussing the possible usefulness of such indexes, the Bureau's Thirtieth Annual Report notes that few people subject the components of comprehensive aggregates to close examination. Aggregates—including the grand aggregate of "general business conditions"—conceal particulars. As the Bureau emphasizes in its various publications on business cycles, there is a great diversity in the cyclical patterns evidenced by different economic time series. Given movements in aggregates may have very different significance depending on the particular developments contributing to them.

In the *American Statistician* article, Moore poses the question, "Is the movement in a given measure of 'business activity' due to erratic changes in one or two components, or is it a widespread and continuing change?" And, he notes at another point, "The purpose [of diffusion indexes] is to show how widely diffused throughout the economy, or within any one sector of it, a particular cyclical expansion or contraction is." The importance of studying the detailed changes underlying changes in aggregates would be agreed to by many analysts, and insofar as diffusion indexes lead in that direction they are undoubtedly useful.

But diffusion indexes are themselves summaries, if of a different sort from the usual aggregates. While it may be useful to know what proportions of activities are participating in a given cyclical movement, it is also desirable to know which activities are participating, how important they are, whether they are the same or different ones from month to month, and how much they are rising or falling—none of which information is provided. The diffusion index, then, is a convenient form of summary, but like all summaries it conceals particulars, and is by no means a substitute for detailed analysis.

Where diffusion indexes are developed from component series of an available aggregate, such as industrial production, they represent, in effect, a supplementary type of summary to that employed in the original aggregation. But many of these diffusion indexes are unique summaries, based on series of different content, that would not ordinarily be aggregated. The "all-inclusive" index in particular has an extremely diverse base, including series ranging from broad measures of production, bank clearings, and currency in circulation to percentage employment among Massachusetts trade union members and sales per store of three restaurant chains. It also involves much duplication through the inclusion as separate series of both totals and selected subtotals or basic components.

The fact that diffusion indexes provide a means for processing heterogeneous information into a single series may in itself be considered to be a virtue. For example, in the *American Statistician* Moore describes the all-inclusive diffusion index in the following terms: ". . . since it embraces so many aspects of business this conglomerate is one of the best historical indexes of the cyclical position of our economy that has ever been devised."

III. The Evidence for Forecasting Merits

The main body of evidence for the forecasting potentialities of diffusion indexes is empirical, and rests on the movements of the historical indexes developed from turning point information alone. Of particular note are the all-inclusive index, and Moore's more restricted index developed from conforming series, shown in his Occasional Paper.

Both of these historical diffusion indexes show definite leading relationships to the Bureau's reference dates, which represent the times that turning points occurred in general business activity. Moore notes that his index comes as close as any individual series to meeting the stated requirements of an "ideal statistical indicator of revivals and recessions," although he finds that the interval of lead is variable, and that the index is not free from erratic movements. The broader-base measure, which begins in 1919 rather than 1885, does rather better, but somewhat the same qualifications would apply.

The fact that turns in these historical diffusion indexes lead the reference dates—in the manner suggested in the bottom panel of Chart I—is the basis for the hope that when adapted to current calculations they can be used to predict turning points in business activity, although the variable interval of lead is regarded as troublesome. For Moore's conforming series index the lead ranged from two or three months in some cycles to nearly three years in others. As Hultgren points out in connection with a diffusion index based on profits data, "[it] may tell us that a turn in business is coming; but this, in an economy in which business cycles are known to prevail, is hardly news." For more than half of the turning points, however (17 cases out of 32), the lead of Moore's index is six months to a year, and the lead of the all-inclusive index is in this range for seven out of ten turning points.

The possibility that diffusion indexes can be used to predict the eventual depth of a contraction shortly after its onset is also based on empirical evidence provided by these historical measures. Moore writes in the *American Statistician* that the all-inclusive index "dips far below 50 per cent in the first few months of the severe depressions of 1929–1932, 1937–38, and 1920–21, but only slightly below 50 per cent in the mild depressions of 1923–24 and 1926–27." The Thirty-third Annual Report gives the levels of this index three months after the onset of those contractions, as follows: 1929, 29 per cent; 1937, 31 per cent; 1920, 38 per cent; 1923, 41 per cent; and 1926, 47 per cent. The Report states that this ranking "turns out to be precisely the same as that of the *depth* which the several contractions eventually reached," but adds "Whether this correspondence has any predictive significance is uncertain."

The evidence, insofar as it is contained in these figures, would appear to be rather weak. It is hard to see how a diffusion index level of 38 per cent for 1920 qualifies as "dipping far below 50 per cent," while one of 41 per cent for 1923 is "only slightly below." Also, while the contractions of 1929 and 1937 may both have been "severe," they were of such totally different magnitudes that the failure of the early diffusion index to discriminate between them by more than the difference between 29 and 31 per cent casts substantial doubt on its predictive significance. Apart from these empirical results, moreover, it might be asked whether there are grounds for thinking that the forces making for deep contractions also generally make for widespread participation at the onset of the decline.

The remaining discussion is confined to the first possibility, that diffusion indexes can be used to predict turning points in business activity.

IV. Why the Historical Diffusion Indexes Lead

The forecasting potentialities of diffusion indexes rest on the feasibility of developing measures on a current basis with properties similar to those of the historical measures. Before proceeding to the question of current calculations, it is useful to inquire why the historical indexes do in fact turn before turns in general business activity, as indicated by the Bureau's reference dates. For this purpose we may consider how both the reference dates and the historical diffusion indexes are obtained.

The method of selecting the reference dates, representing the points in time when general cyclical swings in the economy culminated in peaks and troughs, is summarized by Wesley C. Mitchell in his last book:[3]

> ". . . we started with the contributions of financial journalists, business annalists, and statisticians who have identified successive business cycles in our four countries. Their dates and even their lists of cycles differ; nevertheless, they give rough indications of the periods within which clusters of specific-cycle peaks are likely to occur, and of other periods in which clusters of troughs may be expected. Arranging our findings to see whether they confirm earlier conclusions, to resolve a few conflicts of opinion, and to make sure that notable clusters have not been overlooked is a laborious task, and one that cannot be regarded as finished until all the evidence has been carefully weighed. When we find a definite cluster of specific-cycle turning dates, we accept it as marking the culmination of a business-cycle expansion or contraction, and seek to determine the month within the clustering zone when economic activity reached its largest or smallest volume. These months constitute a tentative set of 'reference dates', which purport to show the troughs and peaks of successive business cycles within a country during the period we can cover statistically."

In brief, while other information was used to narrow the problem, the reference dates are based ultimately on the clustering of turning points in time series taken from the Bureau's collection. As noted earlier, the six to seven hundred series from which the all-inclusive historical diffusion index is developed cover nearly the Bureau's whole collection, and the index based on conforming series includes a somewhat smaller but still very large sample of this collection. According to the Thirtieth Annual Report, "Only a relatively small

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[3] Wesley C. Mitchell, *What Happens During Business Cycles*, National Bureau of Economic Research, New York, 1951, pp. 10-11.

fraction of the series [in the all-inclusive diffusion index] were used in developing the National Bureau's chronology of business cycles." However, when the reference dates selected are compared with turning point distributions for all of these series, as is done for the inter-war period in a chart in the Thirtieth Report, the dates are found to fall in the middle ranges of the clusters.

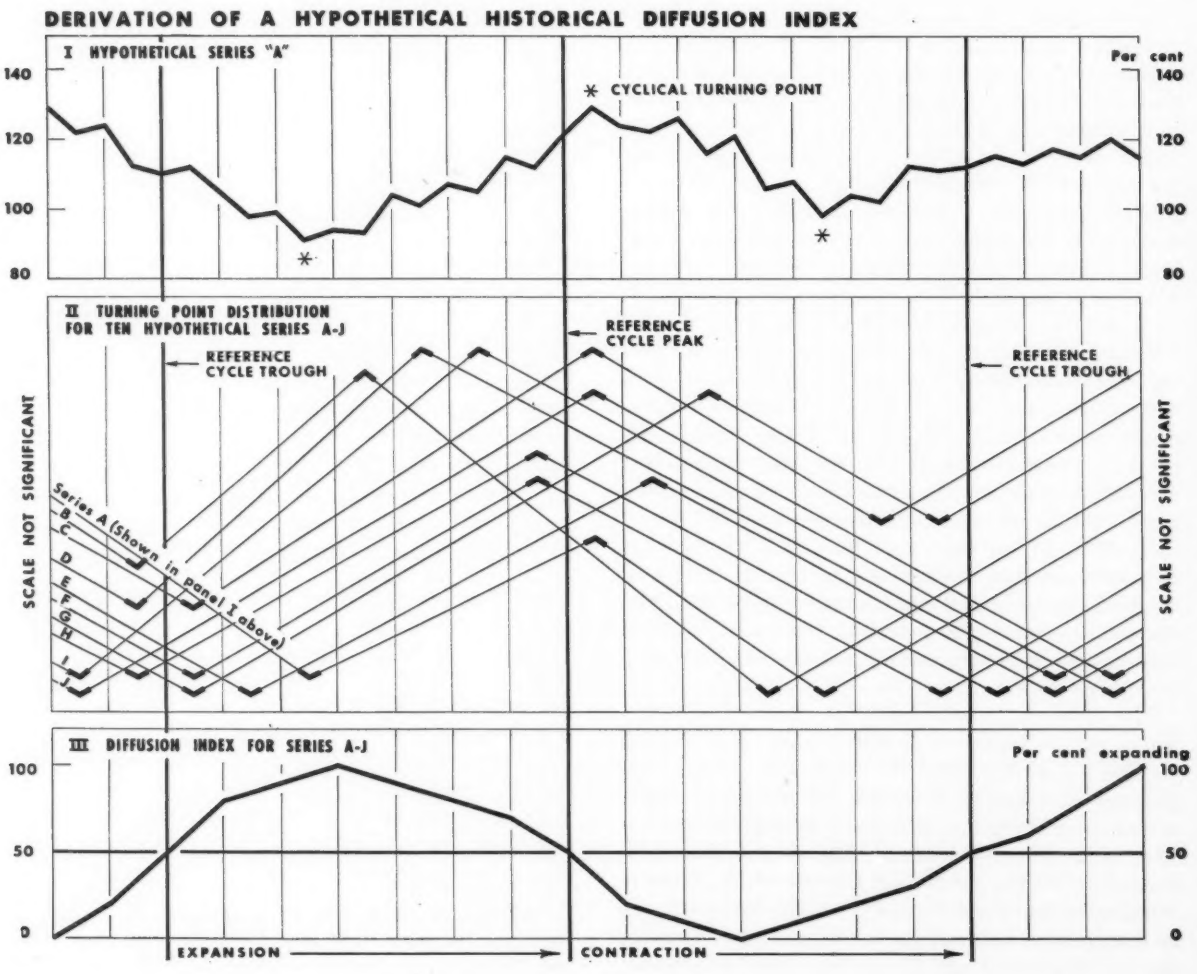
How an historical diffusion index is calculated is illustrated in simplified fashion in Chart I, already referred to briefly.[4] A hypothetical economic time series, series "A", is shown in the upper panel, with asterisks denoting the cyclical turning points—two troughs and one peak in this segment of the series—as they might have been determined by National Bureau methods.

[4] The chart illustration given here is in some respects analogous to an algebraic formulation presented in the Thirtieth Annual Report.

The dates of turning points in this series, A, are carried down to the middle panel of the chart, along with similar dates for nine other hypothetical series, B to J. In the middle panel the cyclical troughs are indicated by heavy V's and the cyclical peaks by heavy inverted V's. The peaks are placed higher than the troughs, but otherwise, as indicated in the chart, the vertical scale is not significant, with the peaks themselves being spaced up and down only to facilitate reading the chart, and similarly with the troughs. The horizontal placement is significant, for it shows when the various hypothetical series included reached turning points in relation to one another. Lighter lines connect the successive turning points for each series. Because peaks are plotted above troughs, these lines have upward slopes when the series is between a trough and a peak, and have downward slopes when it is between a peak and a trough.

For an historical diffusion index a series is counted as

Chart I



expanding whenever it is between a trough and a peak, regardless of what its month-to-month movements actually are. The number expanding at any time can therefore be determined simply by running down a vertical line in the chart and counting the number of upward-sloped light lines encountered. These numbers expanding, when expressed as proportions of the total number of series included, represent the historical diffusion index for this collection of series. This diffusion index is plotted in the bottom panel. Thus, at the left of the chart all the lines in the middle panel are going down, so the diffusion index at the bottom is zero; at the right of the chart all the lines are rising, so the diffusion index is 100 per cent.

A simplifying device used in the chart is to show turning points as occurring only in every other period, with "readings" for the diffusion index taken in the intervening periods. This has the effect of counting turning points as half rise and half fall in deriving the per cent expanding. Actually, the Bureau counts a peak as an expansion and a trough as a contraction.

Two other comments should be made about the way the chart is drawn. First, the turning points of the individual series in the middle panel occur in clusters—a cluster of troughs, then of peaks, then again of troughs. This clustering is consistent with the Bureau's findings for their large collection of series, but the unanimity shown in each cluster is a simplification—the Bureau finds a preponderance of peaks or troughs, rather than unanimity, in the clusters, with some peaks occurring among clusters of troughs, and vice versa. Secondly, the vertical lines labeled "reference cycle trough" and "reference cycle peak" are intended only to indicate the basic fact that the reference dates would fall somewhere within the middle ranges of the clusters.

After this rather long preliminary, we may note that the historical diffusion index at the bottom of the chart has the leading properties of the Bureau's historical indexes, turning down before the reference peak and turning up before the reference trough. With the aid of the chart we may consider why this is so. For the historical calculations, a trough represents a point at which a series stops contracting and starts expanding. The "proportion of series expanding" will therefore be at a maximum at a time after most of the troughs have occurred, but before any considerable number of peaks is reached—that is, after most series have changed from contraction to expansion, and before many begin changing back to contraction. This will occur sometime after the reference trough and before the reference peak. As we move to the right an increasing number of peaks is reached and the diffusion index begins to fall. It will be at a minimum after the bulk of the peaks but before the bulk of the troughs—that is, between the reference peak and trough—and will rise again as more and more troughs occur. The turns in the diffusion index, occurring between the clusters and therefore between the reference dates, will thus lead the second such date in each case.

It is clear that these historical diffusion indexes lead the reference dates because the turning points of individual series from which they are derived tend to form clusters, and the reference dates tend to be placed in the middle ranges of the clusters. The historical diffusion index says, in effect, that these clusters of cyclical turning points occur. Any forecasting potentialities of the approach rest on the possibility of taking advantage of that fact.

Historical diffusion indexes based on smaller samples than the all-inclusive and conforming series measures, and selected according to type of variable or on some other basis (e.g., leading and lagging series), are also found to have the same general characteristics with respect to the reference dates, with differences from sample to sample in timing, amplitude, smoothness, and presence or absence of extraneous movements. That is to say, for the less comprehensive collections of series for which the Bureau has published diffusion indexes of the historical type, the clusters of turning points occur in the approximate neighborhood of the more general clusters, but may be centered on somewhat different specific dates and may show different degrees of internal consensus.

Some of these differences are built in. A diffusion index based on those series which usually turn early will obviously turn relatively early itself; and an index based on series that "conform poorly" to the reference cycle will be flatter than others, because underlying series which show less than the usual degree of agreement with the general movement will usually also show a low degree of internal agreement. Timing differences evidenced by diffusion indexes based on specific variables, such as new orders for investment goods, which tend to lead, and payrolls, which tend to lag, reflect the timing relations of the original data. Historical diffusion indexes are a summarizing device for the study of these relations, and it is through such study that the Bureau hopes that contributions can be made to an understanding of cyclical processes and cycle theories.

V. Current Diffusion Index Calculations

The element of hindsight in calculating an historical diffusion index enters at the stage shown in the top panel of Chart I—identifying the cyclical turning points in the individual series. For its historical calculations the Bureau identifies specific cycles and dates turning points by following a set of rules described in *Measuring Business Cycles*.[5] Moore observes in Occa-

[5] Burns & Mitchell, *Measuring Business Cycles*, National Bureau of Economic Research, New York, 1946, pp. 56-66.

sional Paper 31 that "Often there is some uncertainty about these dates when one seeks to determine them historically, and identifying them currently is much more difficult."

Indeed, identifying cyclical turning points as they occur is a forecasting problem, for a peak comes into existence only as a consequence of a following decline. To say that the most recent month's figure for a time series represents a cyclical peak is to say, in effect, that from that date forward the series is going down—not smoothly, perhaps, but down nevertheless. It would seem, therefore, that forecasting the direction of each of the underlying series would be the first prerequisite in developing a current diffusion index with properties corresponding to the historical measures. But this would be forecasting for the sake of making a diffusion index—not making a diffusion index for the sake of forecasting.

This process of detailed forecasting is not the approach the Bureau has used in calculating current diffusion indexes. Their investigations have been concerned with methods of constructing curves which, as Moore puts it in his Occasional Paper, are "analogous" to the historical diffusion indexes "without recognizing cyclical turning points explicitly." The quest must be for implicit means of recognizing cyclical turning points; otherwise the analogies could not be very close, since the leading properties of the historical indexes result from the clustering of these points. Moore considers using the actual monthly movements of the series in determining the proportion expanding, but finds (in the Occasional Paper) that "during a cyclical expansion some [series] go down almost as often as they go up, on a month to month basis. Moreover, differences among series in this respect are substantial, and the directions of change would provide a less reliable indication of cyclical phase in some series than in others. A simple count of directions of change would not, therefore, be satisfactory."

Moore also considers smoothing the series by moving averages of a period related to their degree of "choppiness," but finds that short-period moving averages often result in imperfect smoothing and that long-period averages, when centered, are out of date, and also "may seriously distort the timing of series at cyclical turns." The difficulty may be stated more generally; while moving averages tend to smooth series, they do so by a general dampening imperfectly related to the very special type of smoothing required here—one which preserves changes in direction only at cyclical peaks and troughs.

Moore suggests a further device, called the "average duration of run," in which the direction of change in each centered short-period moving average is weighted by the number of months it has been of the same sign, and the weighted number of negative series is subtracted from the weighted number of positive series. This weighting would correspond to the degree of confidence that observed changes in the moving averages for the various series are in the same direction as their cyclical changes. The problem would remain, however, of out-dated information because of the use of centered moving averages. Moore says ". . . since the only information required for measuring runs is the direction of change in the moving average, it should not be difficult to devise a reasonably accurate method of extrapolation." The obstacles in the way of reliable mechanical forecasting of cyclical turns in series might appear to others to be very great.

In his *American Statistician* article, Moore makes only a passing reference to these devices ("statistical techniques that may help to distinguish the longer and wider swings are being explored") and implies that he has changed his mind about the usefulness of diffusion indexes based on actual monthly movements. "Although in an individual series this is ordinarily a very inexact way of identifying its cyclical status, in a large sample of series many of these irregularities cancel out, so that the broader cyclical movements can be discerned." As evidence he presents a diffusion index for 1919–53 based on manufacturing employment series and an alternative in which the diffusion index itself is smoothed with a three-month moving average. Both of these current measures show substantially more short-term oscillation than the historical indexes. Moore concludes that these curves "are rather imperfect replicas of their prototypes . . . . But they do bear a resemblance and the approach seems promising."

A number of other current diffusion indexes have been calculated by the Bureau, most of them on the basis of month to month changes in the underlying series, or on the basis of changes in short-term moving averages applied to the underlying series. The "turning points" for these indexes are not cyclical turning points, but actual reversals of direction, or reversals in the direction of the moving averages. Because of the sawtooth nature of most economic time series, there are a great many more such reversals than cyclical turning points. The reversals do not cluster as neatly as cyclical turning points, and the diffusion indexes derived from them pose difficult problems of interpretation because of their irregular oscillations. An example of a current diffusion index based on month-to-month movements is shown as one of the two curves in the lower panel of Chart II, to be discussed in the next section.

VI. Diffusion Indexes and Rates of Change

The significance of diffusion indexes as forecasting devices may be approached from another direction. Their potentialities rest on the fact that the historical measures turn down, and turn up, before general busi-

ness does, and on the hope that current measures may correspond, in useful degree, to the historical measures. But the same characteristics would often be found in a measure of the rate of change in an aggregate such as industrial production.

In periods of expansion, for example, the rate of increase in industrial production frequently would decline before the peak is reached, and be near zero around the peak. In periods of contraction, as the trough is approached the rate of decline would tend to fall off, and be near zero around the trough. But, as with current diffusion indexes, there would be oscillations in between which would be confusing for any analyst.

The similarity between diffusion indexes and rates of change is suggested in another fashion by some operations on the all-inclusive diffusion index described and charted in the Thirtieth Report. There a modification of this index is shown in which the per cent of series contracting is subtracted from the per cent expanding. The modified index has the same pattern of fluctuation as the original diffusion index, but the amplitude is doubled, and the origin is zero instead of 50 per cent. These "net" percentages are then cumulated over time, with a result that turns out to be a smooth ("idealized") representation of the five business cycles of the period covered. But the process of cumulation of the month-to-month net changes is simply the reverse of determining monthly changes in an aggregate; if the resulting idealized aggregate had been the starting point, the modified diffusion index would indicate monthly changes in the aggregate.

One question then is whether the diffusion index contributes anything more by way of predicting turning points of an aggregate than is contained in the rate of change of the aggregate itself. This would turn on the circumstances under which the two measures would diverge, and the significance that may be atached to the divergence.

In the upper panel of Chart II is shown the seasonally adjusted Federal Reserve index of industrial production, and in the lower panel a curve reflecting the percentage changes in the index is contrasted with a current diffusion index based on the month-to-month changes in the 26 seasonally adjusted industry group components of the production index. Both the diffusion index and the percentage changes in the aggregate production index represent summaries of information yielded by observation of the movements in the production index components. The diffusion index summarizes the month-to-month directions of movements in the components, and is altered only by changes in direction. The curve reflecting changes in the production index is affected not only by the directions of movements in the components, but also by the amount of movement in each, and by the relative importance of the different components.

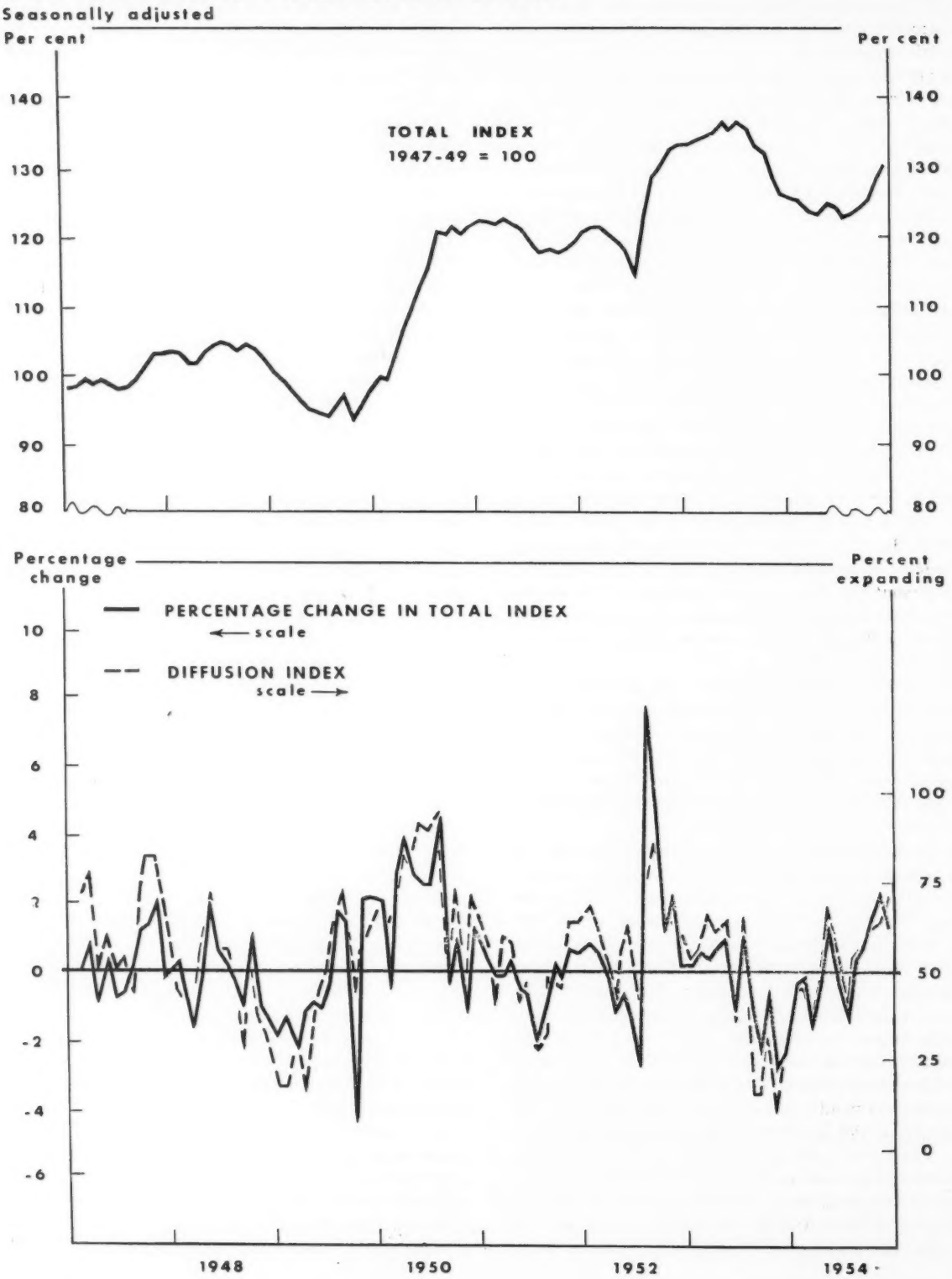
In the diffusion index, in which only direction of movement is considered, one rise offsets one decline, even though the rise may be of 10 per cent and the decline, 1 per cent. The production index takes these different amplitudes into account and will increase as a result of two such changes, other things being equal. Similarly, in the diffusion index a rise of 1 per cent in a large industry group, such as machinery, is offset by a decline of 1 per cent (or any other amount) in a smaller one, such as instruments. Other things again being equal, the production index will rise as a result of these 1 per cent changes in different directions, because machinery is weighted more heavily than instruments. The diffusion index and the curve of production index percentage changes will resemble each other (given appropriate scales) when there is a balance between the amplitudes of rises and the amplitudes of declines, and also a balance in the relative importance of rising activities and of declining activities—or when any imbalance in amplitudes is offset in combination by imbalance of the opposite sort in relative importance. Any preference for the current diffusion index as a forecasting device over the current rate of change in the corresponding aggregate must apply at times when the curves are different—and the preference for the diffusion index must rest on the desirability, for forecasting, of discarding the available information on amounts of change and relative importance of the underlying series, because this is the reason for the difference.

Because of the great heterogeneity of the series used in the Bureau's broadly-based historical measures, and their extensive overlapping, it would not be a simple task to define a standard of "relative importance" under which weights for the component series of such indexes could be developed. However, for the unduplicated, homogeneous series making up an aggregate such as an industrial production index, value-added weights are already at hand, and if some weighting standard different from value added is preferred, such weights might be developed. To ignore the different degrees of importance of the various components and give them all equal status is to employ a weighting system that is conditioned by the particular classification system under which the index is organized, by the degree of detail in the available data for the different sectors covered, and by all of the other factors determining the specific list of components defined in the index. If the production index components were all of roughly equal importance the difference between the two measures on this account would largely disappear.

In general, it would appear that when the diffusion index diverges from a measure of change in the aggregate on account of weighting, the preference might generally be for the latter; little would seem to be gained by discarding information on relative importance —although, of course, particular standards of relative

Chart II

F. R. INDUSTRIAL PRODUCTION INDEX



importance are often matters of choice. That the Bureau may see potential value in differential weighting for diffusion indexes is suggested by the fact that they have conducted experiments with weighting where the indexes are based on homogeneous, unduplicated series.

The desirability of ignoring amplitude, however, is at the heart of the diffusion approach. The premise would appear to be that the proportion of individual activities in *conditions* of cyclical expansion or contraction is what matters for the future, and not the *amounts* by which activities are expanding or contracting; that the latter is not only irrelevant, but obscuring. On this reasoning, if cyclical contractions at any one time are generally smaller than expansions but more widespread, the diffusion index will properly yield a more bearish conclusion than the rate of change in the aggregate, in which the greater amplitude of rises would tend to offset the larger number of declines.

The premise, which is implicit in the approach rather than explicitly stated in the Bureau's discussions, apparently goes back to the finding of Burns and Mitchell that "the degree of cyclical diffusion is correlated with the amplitude of cyclical fluctuations."[6] In establishing this correlation Burns and Mitchell were forced to rely on three "familiar indexes of business activity" —the A.T.&T., Persons, and Ayres indexes—for determining the relative amplitudes of past business cycles, because their procedures did not yield independent measures of amplitude for general business cycles. But the amplitudes of fluctuation in individual series vary from cycle to cycle, as the Bureau's studies demonstrate, and presumably these variations are also correlated with the amplitude of fluctuations in the total. In terms of a particular aggregate and its components, a correlation of both the degree of cyclical diffusion and amplitudes in individual series with the amplitude in the total is tautological; the larger the number of series that are contracting, and the lower they go, the more the total declines. Whether the proportions of series that are rising and declining, or the average magnitudes of rises relative to declines, or the net effect of both variables is the most significant in foreshadowing the future would seem to depend on circumstances. It probably would be difficult to make a general case in favor of discarding information on amplitudes as a means of improving forecasts.

An exception might be made for isolated and temporary events which cause abrupt changes in a total index, such as some strikes, or unusual weather. These are automatically discounted in the diffusion index. Moore's question, quoted earlier, is appropriate to this point: "Is the movement in a given measure of 'business activity' due to erratic changes in one or two components or is it a widespread and continuing change?" But it is a long way from discounting a few erratic changes to ignoring amplitudes generally.

Even a cursory study of Chart II suggests that forecasts of the production index could be made about as readily from the percentage change curve as from the diffusion index—and not very readily from either. The curves are similar not only in the broad but also in some of their finer movements, indicating that in this period there was no marked tendency toward imbalance between rising and falling production series in either amplitudes or relative importance, or that any imbalances that did occur offset each other. The rather large differences between the curves in 1949 and 1952 are associated with major strikes in the steel industry in those years. It might be noted that the relative importance of the major industry groups of the production index ranges from 10.73 per cent of the base period total for food and beverage manufactures to 0.36 per cent for anthracite, and the amplitude of monthly changes in the group indexes varied widely over the period.

This discussion of the relative forecasting merits of diffusion indexes and rates of change has assumed that both measures were developed from components of a particular aggregate, and the variable to be predicted was the aggregate itself. The problem thus posed differs in two respects from that implicit in the Bureau's published discussions, and either difference may obscure possible merits of the approach. First, in the Bureau's publications diffusion indexes based on components of a given aggregate are usually viewed in terms of their predictive merits for business conditions in general, rather than for the aggregate involved. Secondly, the Bureau's implied definition of business conditions is broader than any real or hypothetical aggregate, simultaneously involving consideration of production, employment, prices, inventories, stock exchange transactions, and many other non-additive variables, and some of the historical diffusion indexes have correspondingly heterogeneous bases.

It is not likely, however, that serious violence is done to the merits of the diffusion index approach on either count. As to whether the variable to be predicted is the given aggregate or business conditions in general, any differences in results would depend on the relationship between movements in the aggregate and in general business, and consideration of these might reasonably be placed outside the scope of a discussion of diffusion indexes themselves. On the second point, it is true that in the absence of a defined aggregate for business conditions there can be no rate of change, and the comparative significance of diffusion indexes and rates of change cannot be discussed. However, by the same

[6] *Ibid.* p. 106. This is distinct from the putative correlation, discussed earlier, between the degree of diffusion early in a contraction and the *eventual* depth of the contraction.

token the significance of a diffusion index with a heterogeneous base is not readily determined. The demonstration in the Thirtieth Annual Report that by cumulation the all-inclusive diffusion index can be made to yield an aggregate resembling others in its cyclical movement suggests that it is not unreasonable for the present purpose to treat general business conditions in terms of specific broad aggregates.

VII. Conclusions

The National Bureau has emphasized in various places that the forecasting potentialities of diffusion indexes remain to be fully explored and that, at best, measures of diffusion can be only an aid rather than a solution to the problem of forecasting. As it is put in the Thirtieth Annual Report, ". . . it is vital, both theoretically and practically, to recognize the changes in economic organization and the episodic and random factors that make each business cycle a unique configuration of events."

Insofar as the calculation of diffusion indexes directs attention to the diversity in economic experience and the need for looking behind aggregates, diffusion indexes are undoubtedly useful. They may also be useful in historical studies, in constructing business cycle theories, and in summarizing heterogeneous developments.

Whether diffusion indexes can make a substantial contribution to current economic forecasting, however, at least in their present stage of development, is highly doubtful. The "remarkably regular cycle" of the historical measures is obtained by separating cyclical turning points from all other changes in direction sometime after the event, with the omniscience of hindsight. In the nature of the case such curves cannot be reproduced on a current basis without the detailed knowledge of the future that would make them unnecessary. The types of indexes that can be calculated currently, by using actual monthly movements of the underlying series or by employing various weighting or smoothing devices, bear only faint relation to the historical measures, both in rationale and in results obtained. And current diffusion indexes appear to have a significance little different from that of rates of change in aggregates.[7]

It is true that most business analysts rely in some degree on recent changes in aggregates for their evaluations of the outlook, and they may also find useful measures of the scope of current movements. A discernible decline in the rate of decline--whether month by month or for longer intervals—is reasonably taken as a basis for some optimism, and the first few increases, following a long succession of declines, for more. Large increases are more encouraging than small; similarly, wide participation is more encouraging than narrow. After all, these things must happen as cyclical declines become cyclical rises.

But the usefulness for forecasting of summary material concerning rates of change or numbers of series rising would appear to be limited. Such information can be readily obtained in one form by looking at charts of aggregates and their components, although without the same sharp—and exclusive—focus on change. More important, the better that the reasons for current levels and movements of series are understood the more firmly their indications for the future can be assessed, and for this, other types of analysis would appear to be indispensable. At least some of the analysts who use diffusion indexes would no doubt agree to this and would join in deploring any mechanical use of such indexes as a substitute for considered appraisal of economic developments.

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[7] Because of the general resemblance between diffusion indexes and rates of change (at least in some cases) the diffusion measures may be useful in certain circumstances for interpolating between aggregate values available only at infrequent intervals, or for indicating approximately the movements in an aggregate currently unavailable.

THE FUTURE ANNUAL MEETINGS OF THE ASSOCIATION WILL BE HELD AS FOLLOWS:

	Headquarters	Dates
1955 New York City	**Hotel Biltmore**	**December 27-30, 1955**
1956—Detroit, Mich.	Hotel Sheraton-Cadillac	September 7–10, 1956

PROBLEMS OF PROVIDING A UNIVERSITY PROGRAM IN STATISTICS

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In the article, "Instruction in Statistics in the Colleges and Universities of the South",[1] an attempt was made to present some of the most important of the findings of an inventory that was made in 1953 and 1954 under the sponsorship of the Southern Regional Education Board. The reports from the colleges and universities, the expressions of opinions of teachers of statistics, and the discussions of members of the Board's Commission on Statistics and the participants in the two Southern Regional Conferences on Statistics all converged on the supervisor of the inventory in his efforts to work out enough of a synthesis of the data to be able to prepare a report. This experience led to considerable speculation on the problems that confront institutions of higher learning in providing a program of instruction and research in statistics. The present article is a discussion of those problems.

Effect of Differences in Institutions

An easy way to summarize the situations that were found in the colleges and universities of the South would be to say, "The conditions were highly varied," or "A great amount of diversity existed." Such statements would seem trite and meaningless but the existence of variety may be important because variety in conditions suggests possible variety in the development of adequate programs of instruction and research; the problems of one institution may differ from those of an institution with other characteristics and may require a different kind of program.

Difference in size may greatly affect at least the immediate problems that confront an institution. Colleges and universities vary by relatively small differences from the very small general college to the large university, and so it is not realistic to attempt to place each institution in one of two classes. For purposes of discussing problems, however, it is helpful to contrast the small general college with the large university.

The small college can be assumed to have a small student body, and a correspondingly small faculty. Also its financial resources are likely to be very limited. These conditions provide a setting which must be remembered in considering advisable lines of action for the college to attempt. The student body may have much the same diversity of interest in subjects as that of a large institution. From the point of view of the individual student, it may be just as desirable to provide instruction planned for his particular need as it is to do so for his counterpart in the large university. The fact that there are only a few who have the same interests makes it difficult if not impractical to provide the kind of courses that would be required to meet individual needs. The small faculty also affects the situation. In many colleges a relatively broad field of knowledge is represented by a single faculty member. Few faculty members have had formal training in statistical methods even with respect to the more elementary applications in their subject-matter fields. On the one hand, small colleges do not have a sufficient number of students with like interests to permit teachers to develop highly specialized courses; and on the other hand, they cannot afford to hire enough teachers with training in specialized fields to man adequately a program that would enable each department of economics, psychology, sociology, or biology to offer courses in statistics taught by men competent to do so. On the financial side also the small college is operating under severe conditions. The college is faced with the need of offering at least a minimum number of courses in the fields essential to maintain its position on the accredited list of its association and to continue to attract students. Its funds often are no more than enough to meet these minimum requirements, and it has little to spend on specialized facilities for classes that have only enough students to be taught once each year. Thus, entirely aside from the question as to what is the most effective approach to the teaching of statistics, the logic of the situation in the small college is toward courses in statistics for all students rather than courses designed for different students according to their major subject-matter interests.

[1] H. H. Chapman, "Instruction in Statistics in the Colleges and Universities of the South," *American Statistician*, April, 1955.

The situation in the large university is quite different. Large student bodies make it possible to give quite highly differentiated courses and still have class enrollments that are large enough to satisfy administrators. Instructional departments with several members can plan their hiring policies so that the specialized fields within the department are well represented by persons trained in each particular field. While no university ever has funds that are entirely commensurate with its needs or opportunities, yet the large university can make choices as to how it will budget the several million dollars that it will expend annually. In other words, if the university authorities decide that it is sufficiently important to develop a particular type of statistical program, they probably, within reasonable limits, can find some means of doing so although the means may not be pleasant to parties interested in other programs.

The point to this discussion is that recommendations for specific action programs must give consideration to the size and resources of the institutions that are affected.

Diversity in institutions of higher learning is not limited to differences in size but exists also in the functions that they have come to assume. An examination of combinations of major curricula offered by the colleges and universities of the South at least tempts one to say that there is no typical pattern for a university. Part of this diversity of programs results from what might be called historical accident. Thirty, forty or fifty years ago the university hired without any conscious design a man who proved to be able and aggressive, and that man succeeded in gathering about him able associates and in developing a department or a program that brought distinction to the university. Assignment of function to state-supported institutions has led to some surprising combinations of functions. In many states the engineering and agriculture colleges are associated in the polytechnic institutes or state colleges; in Georgia, agriculture is assigned to the University of Georgia, and Georgia Institute of Technology is primarily a school of technology. Rivalry of institutions has resulted in the establishment of some curricula that are difficult to justify; on the other hand, legislative attempts to eliminate so-called duplications by unified university plans have had results that sometimes seem almost as bad as the disease.

Even though two universities have been assigned the same function, it cannot be assumed that the servicing of that function can be done in the same manner. This is particularly true of the medical sciences. The University of Tennessee and the University of North Carolina both have the responsibility of administering medical schools. At North Carolina the medical school is on the Chapel Hill campus; at Tennessee the main university campus is in Knoxville, but the medical school is in Memphis some four hundred miles away. The scheme for providing a well-integrated statistical service that may work well at North Carolina may be entirely impractical in neighboring Tennessee.

Diversities in function are certainly present to a high degree in the institutions of the region. If the statistical programs are conceived to be largely related to the specific needs of the subject-matter fields and other functions of an institution, then the effects of the diversity raise important questions.

Differences in Objectives of Programs in Statistics

Another source of diversity lies in the concepts that seem to have developed as to the place that statistics may have in college and university curricula. Existing practices seem to suggest these three types of objectives:

1. To give all students in subject-matter fields instruction that will enable them to understand the uses and limitations of statistics in these fields and perhaps to handle the simpler statistical problems;
2. To give students a working knowledge of fundamental statistical concepts and methods with particular attention to the applications in a subject-matter field;
3. To train students in mathematics, mathematical statistics, and a fairly wide range of applied statistical techniques so that they are prepared to become professional statisticians.

To meet these varied objectives raises many questions. For students to whom objective No. 1 applies, the introductory course, usually one semester or quarter or at most two semesters or quarters in length, is terminal. Curricula aimed at objective No. 2 range from one or two intermediate or advanced courses, often in some specialized statistical technique, to programs for minors and majors in statistics on the bachelor's and master's levels, to Ph.D. programs with concentrations in statistics. Curricula to meet objective No. 3 place strong emphasis on probability mathematics and theory of statistics.

Differences of Opinion of What to Do

If attention is turned from the diversities in size of institutions, in functions, and in practices actually in existence to the opinions of how statistics should be taught and what should be done in developing the right kind of statistical program, there seems to be a rather sharp division of thought. This probably appears most clearly as related to the best approach to the study of statistics. On the one hand, there are those who favor uniform or basic courses taught largely as principles courses. This means that emphasis is placed on the general and the abstract. On the other hand, there is a more numerous group who think that statistics courses should be taught in the subject-matter departments

and that the solution of the problems encountered in the subject-matter field should hold the center of attention. The emphasis of this group is on applications rather than on abstractions, and their approach leads to a diversity of courses rather than to a few uniform courses for all students.

While the differences of viewpoint show most sharply in the approach to the introductory courses, similar differences appear with reference to other problems as well and seem to be related to the general attitude as to what constitutes the subject of statistics and even beyond that as to what are the proper functions of an institution of higher learning.

It is always unrealistic to divide a population into two sharply contrasting groups because actually there are many shades of difference. Probably this is particularly true of opinions of university faculties. However, it may serve a useful purpose to set up two viewpoints as the poles toward which individual teachers tend to gravitate.

With reference to what really constitutes statistics, one viewpoint which is much in evidence is that statistics, the real, sure-enough statistics, consists of a group of principles firmly based on mathematical probability; a system of logic which provides the foundation for drawing sound inferences when observations are made in accordance with the conditions assumed by the probability theorem invoked. Those who tend to this view think of statistics in terms of universal principles that are the same whether the particular application is to economics, biology, education, or medicine. They put the emphasis on the abstract expressed in symbolic language and believe that the person who has mastered the principles should be able readily either to make direct applications or to modify the statement of general principle to meet special situations. To them the important objective of a statistician is either to refine or sharpen the existing statement of statistical principles or to develop principles that apply to new problems in probability; in other words, to make contributions to statistical theory.

A view that historically has much longer standing and is more widely held by people generally is that statistics essentially arise from attempts to represent factual material with figures and that the problems of statistics are those that have to do with the effective and sound use of such numerical data. Such a view presumes that there is a definite problem to be solved or decisions to be made and that the function of statistics and the statistician is to aid in the solution or the decision. Such a view does not exclude mathematical probability. It may very well give it a very important place as providing the logic and the tools that are essential to sound statistical analysis and reasoning, but it does say that mathematical theory is not the whole of statistics. Those who hold this view may say that statistical theories are always postulated on certain assumed conditions. In an actual situation or problem, these people contend that there is always the question as to whether the assumed conditions are being met. Statistical theory alone cannot answer the question. For example, probability theory may make important general suggestions as to how to draw a representative sample from the residents of a state; but a knowledge of the particular characteristics of the population that are pertinent to the problem, the feasibility of securing measurements of those characteristics, and the approximate frequency of occurrence may be essential to planning the selection of the sample. Furthermore, skill in formulating the questions to be asked and in contacting and interviewing the respondents may be factors that in the end produce either good or bad statistics. According to this view the theoretical and the applied are so intimately interrelated that to expose the student only to the theoretical or abstract is to give him an incomplete view.

Underlying these two contrasting views concerning statistics, one may detect contrasting views of the general order of things. The one believes that universal principles are the ultimate realities and that the solution of problems lies in penetrating through the apparent but inconsequential differences that becloud the situation to the real issues—the general principles that apply. The other takes a more empirical or pragmatic point of view. While the representatives of this point of view may make use of theory and theoretical techniques, they consider them as useful tools for analysis but not necessarily the expressions of the ultimate nature of things or even of the particular phenomena that they are examining. They are interested in particular situations and are inclined to believe that real thinking and real progress are made only when the student or the practitioner attacks a situation in which he has direct interest.

These contrasting views influence the attitudes and opinions of the various groups of people who are concerned with the problems of higher education. The believer in the supreme value of abstract concepts and the theoretical approach quite logically sees little to justify the development of practical or applied courses, curricula, or schools in a college or university. If such programs must be provided they belong in a lower order of endeavor and should be given to individuals of a lower order of intellectual interest and intelligence. The person with a good mind does not need such training, because with proper grounding in the fundamental principles that underlie pure science and real culture, the truly educated person will be able to solve his problems as he comes to face them. If this view is adopted it follows quite naturally that higher institutions of learning should be fundamentally devoted to the liberal arts and to pure science and that only young

men and young women who do well in such a program should be accepted as students. In statistics the tendency would be to give principles or theory courses to students with a strong mathematical background and a liking for and an aptitude in handling abstractions.

The believer in the second school of thought—the empirical and pragmatic—places the emphasis on specific and actual problems—problems that the people of the community or nation are facing in trying to make their civilization function. Such a person sees no sharp distinctions in the cultural and educational value or place of subjects so long as they are dealing with conditions that are frequent enough in occurrence and difficult enough in nature to demand special training. Furthermore, he has no great faith in the direct carry over of general principles to all kinds of differing situations but believes that the particular conditions that provide the setting and influence the outcome in a given field of endeavor require study and that such study occupies an essential place in the educational process along with the theoretical. Beliefs of this kind lead directly to the conclusion that a university can quite legitimately enter many different fields of work and further that it has a function in training those who fall in the middle ranges of attainments as well as the students who are outstanding intellectually. Statistics according to this viewpoint has a place in the solution of problems in many fields and on many levels of difficulty. Therefore students in widely differing fields need at least some acquaintance with statistical methods and should be given the training in the manner that will be most useful to them.

Certainly the attitude last described has had a tremendous influence on American colleges and universities. To a very great extent, it is the attitude taken by a very large part of the constituency of an institution of higher learning—the parents and the students. The parent expects the son or daughter to come out of college prepared to take a job and make a living. The students want courses that will, as they say, "do them some good when they graduate." These attitudes exert great pressure on colleges and universities often to the extent of inducing the small college with limited resources to attempt to offer programs of study that they are ill prepared to undertake. It is probable, however, that the most decisive influences have come from within college and university circles because the educational philosophy of many of the leaders has tended toward the empirical and pragmatic.

A Suggestion of a Workable Reconciliation

The question naturally arises as to whether one or the other of the two opposing viewpoints will prevail or whether it is possible to find virtue in both and a middle road that will accomplish a workable reconciliation. If a workable reconciliation is to be found, the question can be raised, "What can provide a basis for agreement?" Perhaps an interpretation of the historical development of statistics into a discipline might provide a suggestion. There is at least some ground for believing that the interest in statistics developed because individuals encountered problems that led to counting and measuring in order to state facts in a form in which they could be comprehended and used. If the statesman was to plan to secure the amount of revenue that he desired or to raise an army large enough to back up his foreign policy, he needed figures on the number of persons and the kind and value of property in his domain; if states were to have representatives in proportion to their population, then counts had to be made. Hence statistics. If a biologist became interested in the results of hybridization, he could carry on his experiments and make counts of the results. If the economist was interested in the behavior of prices, he could keep a record of price quotations. All this was very simple. He who could run could count.

As time went on, however, the juggler of figures began to be aware of problems. The figures were getting complex and unwieldy. Better ways of handling the data and getting the facts in condensed or summarized form were needed. What seemed to be patterns of behavior sometimes appeared and seemed to persist. Could ways be found to formalize these patterns with generalizations? The mathematician came into the picture and statistical theory began to take form.

Perhaps the development of instruction in colleges and universities tends to follow lines similar to those suggested in the two preceding paragraphs. Interest has largely originated in and been generated by the usefulness of statistics and statistical methods in the subject-matter fields. This interest has led to the establishment of the multitude of courses that exist at present in institutions of higher learning. It is doubtful that as rapid or as widespread a development would have taken place in any other way.

With the interest in statistics in the several fields has come the discovery that the statistical problems and procedures in the individual fields have much in common. There has arisen also an awareness of the importance of a sound grounding in statistical theory as a basis for the intelligent use of statistics and the further need for new and specialized statistical techniques which can be developed only by those who are specialists in statistical theory. In this way those whose first interests were in the direct applications find that they are not able to stand alone but can secure much help from others. Then arises an interest in coordination, cooperation, or integration because such a condition provides the chance of developing the specialized procedures and

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QUESTIONS AND ANSWERS

Edited by ERNEST RUBIN
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Statistical Problems of a Special Case

Discussion by *JOHN H. SMITH*

Last year President Eisenhower declared December 15, 1954 "Safety Day." This fact was proclaimed throughout the land in advance of that date. Subsequently the special day came and thereafter, the accident statistics for it. A perspicacious reader (who prefers to remain anonymous) sent me a newspaper clipping which indicated that there might be three schools of thought as to the effectiveness of the Safety Day program. The three possibilities are that the number of accidents on Safety Day in relation to expectation was (a) significantly smaller, (b) significantly greater and (c) not significantly different.

The problem of special cases in statistical investigations is a common one. Frequently the special case is the most important one and arises as a limiting situation in a sequence or set of observations. The trend in statistical methodology has been from large samples to smaller ones and from small ones to a consideration of the limiting case of 1 observation. (I understand that certain authorities have developed a new field, metastatistics which enables them to infer from samples of 0 size.) Professor John H. Smith of American University, who has written extensively on statistical tests of significance, has kindly undertaken to discuss the types of problems incident to an analysis of the "Safety Day" situation.

On December 17, 1954 a short news story in the New York Times stated that 51 traffic deaths and 1785 traffic injuries across the country had been reported for the Safe Driving Day which was observed two days before. It also noted that delayed reports might add to these totals. I have been asked to discuss problems which arise in the analysis of data of single events such as the observance of Safe Driving Day for the purpose of making inferences as to the effects of certain designated causes, such as the efforts of President Eisenhower's Action Committee for Traffic Safety.

The example of Safe Driving Day is a good one for me to use because, in my opinion, the effects of safety publicity for that occasion were greater than the data of the news story seem to indicate. For this reason, I am not tempted to be hypercritical. On the other hand, it seems clear that the statistical evidence as to the effectiveness of the safety publicity is very weak.

To begin with, the number of traffic accidents in a given day is correlated with a great many variables such as day of the week, season of the year, holidays, weather, road conditions, and number and speed of vehicles on the road in addition to the publicity designed to promote safety. Many of these factors have several different aspects, only a few of which are quantitatively measurable, and would therefore be extremely difficult to summarize satisfactorily. Of course, many of the factors are highly correlated with each other. Under these circumstances, it is practically impossible to adjust the number of traffic casualties for the most important relevant factors. Nevertheless, comparisons of numbers of traffic deaths and injuries for Safe Driving Day with similar figures for past days or periods should be better when attention is given to factors known to be correlated with numbers of traffic deaths and injuries.

Since the data on traffic casualties on Safe Driving Day are for a single observation, they contain very little quantitative information on effects of safety publicity for that day. Hence, one should not expect the difference due to any cause to be statistically significant unless it is large in comparison with the standard deviation of chance variation. To minimize the effects of chance variation, one should use as broad a base for comparisons as it is feasible to obtain. Ideally, this should be the mean numbers of the two types of traffic casualties for a large number of days comparable with Safe Driving Day; that is the base period should be comparable with respect to all important variables correlated with number of traffic casualties except for the safety publicity whose effects are to be measured. Variation among these daily figures would provide unbiased estimates of the variances of the differences between numbers of traffic casualties on Safe Driving Day and similar figures for the base period. Variances of differences such as those here suggested are only slightly greater than half those of differences between the figures for a single day and similar ones for another single day such as are implied by the comparisons made in the news story. There the 51 traffic deaths and 1785 traffic injuries reported for Safe Driving Day were compared with the 60 traffic deaths and the 1807 traffic injuries reported for December 15, 1953. As a rough approximation, one may assume that the distribution of number of traffic deaths on comparable days is a Poisson distribution. This implies that the sum of the

numbers of a given type of traffic casualty on two single days provides an estimate of the sampling variance of their difference. In this way, the suggested reduction of 9, i.e., 60 − 51, in traffic deaths is subject to a sampling variance of about 111, i.e., 60 + 51, while the indicated reduction of 22, i.e., 1807 − 1785, in traffic injuries is subject to a sampling variance of about 3592, i.e., 1807 + 1785. In this case, the difference is less than its estimated standard error and hence it might easily have happened by chance.

The question of the degree of comparability between Safe Driving Day and the same date in 1953 with respect to conditions related to traffic safety is far more important than that of the unusualness of their difference (assuming that it is due to chance variation). Unfortunately, it would have been quite a task to assemble relevant information on this point immediately following Safe Driving Day and it would be much more difficult now. Accordingly, about the best that could be expected in a more extended analysis of data on traffic casualties would be to try to establish a base period of days which are reasonably representative of days in the middle of the week at that time of year. This would be much easier than to select days for a base period which are reasonably comparable with Safe Driving Day with respect to traffic safety conditions. On the other hand, variation in number of traffic deaths and traffic injuries from one day of the week to the next and especially from days in the middle of the week to week ends is too great to be neglected. For example, it might be relatively easy to obtain the average numbers of traffic deaths and traffic injuries for all December days from 1949 to 1953. However, such data would be unsatisfactory as bases for comparisons unless fairly accurate adjustments could be made for the greater number of traffic casualties per day on week ends and during the holiday period around Christmas and New Years Day.

In conclusion, it is often necessary to make a decision as to the data of a single event. Such decisions should usually depend to an important degree on information which is more or less non-statistical. Nevertheless, it should be possible to give some weight to the small amount of statistical information contained in such data. When this is done, allowances for chance variation may have to be based on very rough approximations. In any case, it is essential to give careful consideration to comparability of conditions of the single event with those of the period from which data for comparisons are obtained.

UNIVERSITY PROGRAM IN STATISTICS

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services. Students on the more advanced levels are fewer, and the possibility of offering any instruction may lie in bringing together persons with different subject-matter interests. Also such students are more mature and better able to see how their particular interests can be related to a generalized technique. Furthermore, the more advanced techniques may involve tabulation or computation facilities that no single specialized subject-matter field can hope to provide by itself. Such a line of thought suggests the idea that perhaps the important place for coordination is in the institutions that already have made considerable progress in developing courses in statistics and that the area where coordination is needed most is on the level of advanced theory and techniques and in the specialized services.

NEWS ABOUT MEMBERS

Leo Bailey, formerly Assistant Chief of the Engineering-Economics Research Division of the Battelle Institute, has moved to Geneva as an assistant to Dr. Frank C. Croxton, director of Battelle's European operations. Mr. Bailey has been on a temporary assignment as the Institute's representative in Madrid.

Grant I. Butterbaugh, President of the Seattle ASA chapter, and editor of the *International Journal of Abstracts on Statistical Methods in Industry* has been invited by the International Statistical Institute and the Brazilian Government to attend the 29th biennial session of ISI in Rio de Janeiro this June–July. The agenda includes a meeting of the Editorial Committee of the *Journal*.

Henry Cohen, formerly Director of the Division of Research of the Department of City Planning, New York City, has been appointed by Dr. Luther Gulick, City Administrator, as Senior Management Consultant in the Division of Administration.

Francis G. Cornell, Professor of Education at the University of Illinois, has resigned his post to become a partner with the educational consulting firm of Engelhardt, Engelhardt & Leggett, New York City.

John B. Cramer, formerly a statistician at Camp Detrick, Maryland, has joined the staff of Engineering Research Associates, a division of Remington Rand, at St. Paul, Minnesota, as a mathematical systems analyst.

Joseph S. Davis, Director Emeritus, Food Research Institute, Stanford University, has been appointed a member of the Council of Economic Advisers, succeeding Walter W. Stewart, who resigned effective May 1, 1955.

Clarence B. Fine, formerly a mathematical statistician in the Statistics Division of the Internal Revenue Service, has transferred to the Appellate Division, where he is Chief of the Operations Analysis Branch.

William C. George, Bureau of the Census, has returned from his one year assignment as a Point Four consultant to Jidda, Saudi Arabia, and Baghdad, Iraq. After a short period in the Office of the Coordinator, International Statistics, Mr. George will return to the Foreign Trade Division.

Marian H. Gillim, Associate Professor of Economics at Barnard College, has been named executive officer of the Barnard Economics Department. Miss Gillim, who has served as acting executive officer this year, will replace Dr. Raymond J. Salnier, recently named by President Eisenhower to the Council of Economic Advisers.

Edwin D. Goldfield, formerly Program Coordinator in the Population and Housing Division, Census Bureau, has transferred to the position of Chief of the Statistical Reports Division.

E. J. Gumbel has been appointed Visiting Professor for Mathematical Statistics at the Free University of Berlin (West) for the summer term 1955.

Herman E. Guterman, formerly with Special Studies in the Reports and Statistics Service, Office of the Comptroller, Veterans Administration, has transferred to the Sampling and Estimating Methods Section, Statistics Division of the Internal Revenue Service.

Robert H. Hanson, formerly with the Statistical Research Division, Bureau of the Census, has transferred to the Census Operations Division, to serve as Chief of the Service Census Branch.

Kenneth Harwood, chairman of the University of Southern California's Department of Telecommunications, has been elected regional director of the Association for Education by Radio-Television. He is to direct AERT activities in the Pacific Southwest region for a two-year beginning May 1st. Now in its 15th year, the AERT is composed of educators and others who are interested in teaching by means of broadcast media.

Manuel L. Helzner, formerly with the Division of Postal Rates, Post Office Department, has joined the staff of the National Planning Association as Associate Economist.

Norman F. Heydinger has been named manager of the Sales Statistics Department of Seiberling Rubber Company.

Joseph W. Hines, U. S. Bureau of Labor Statistics, has been transferred from Richmond, Virginia, to Atlanta, Georgia, where he will serve as Assistant Employment Analyst for the Southern Region of BLS.

R. J. Jessen has been on leave from the Statistical Laboratory, Iowa State College, to serve as technical expert for FAO for six weeks at a Latin American Demonstration Center on Agricultural Sampling Techniques being held in Buenos Aires, Argentina.

Thomas J. Lanahan, Jr., formerly with the Division of Prices and Cost of Living, Bureau of Labor Statistics, has transferred to the Consumption Section, Statistical and Historical Research Branch, Agricultural Marketing Service, to work on analysis of data from the national food consumption survey now under way.

Jacob Marschak will spend the academic year 1955–56 as a Fellow of the Center for Advanced Study in the Behavioral Sciences, Stanford, California, on leave of absence from the Cowles Foundation for Research in Economics, Yale University.

Samuel T. Mayo has been appointed Director of the Division of Educational Measurements of the Council on Dental Education of the American Dental Association. The Division is located in the central office of the Association in Chicago, and is responsible for the Dental Aptitude Testing Program, in which virtually all applicants for dental schools are tested, as well as for some surveys and statistical studies.

F. A. A. Menzler, who retired recently as Chief Development and Research Officer of the London Transport Executive, has been appointed adviser on economic, statistical and technical research to Messrs. Phillips & Drew, stock brokers. He is also practicing as a consulting actuary.

M. Ray Mickey has resigned his position as Assistant Professor in the Statistical Laboratory of Iowa State College to rejoin RAND Corporation, Santa Monica, California. He will be part of a group working on logistic problems for the Department of Defense.

Maurice E. Moore, who has been serving as Regional Productivity Analyst, U. S. Bureau of Labor Statistics, has become a consultant for Wolf Management Engineering Company, Chicago. He will conduct research in operations research, measurement of productivity on the plant and company level, and automation.

Noriar Pahigian, formerly with the Bureau of Ordnance, Department of the Navy, has transferred to the Economic and Cooperative Marketing Section of the Fish and Wildlife Service, Department of the Interior.

Arlyn C. Rosander, formerly Acting Chief of the Sampling and Estimating Methods Section, Internal Revenue Service, has been made Chief.

John C. Rowan has taken a position with the Bureau of the Census under contract to the California State Department of Health.

A. E. Sarhan finished his work for the Ph.D. degree in the Department of Biostatistics, University of North Carolina, in December 1954.

Raymond J. Saulnier, Professor of Economics at Barnard College, Columbia University, has been appointed a member of the Council of Economic Advisers, succeeding Neil H. Jacoby.

Eleanor Snyder is on loan from the Bureau of Labor Statistics, to serve as a staff economist for the Sub-committee on Low-Income Families, Joint Committee on the Economic Report.

Morris J. Solomon, formerly with the Department of the Air Force, has been appointed to a position in the Statistical Methods Section of the Statistical Research Division of the Bureau of the Census.

Nobi Takahashi, formerly Assistant Research Director of Russel M. Seeds Company, is now a counsellor and broker in applied research and statistical operations under the firm name of Nobi Takahashi, Chicago, Illinois.

Earl A. Thomas, formerly Mathematical Statistician with the Research and Development Division, Bureau of Ships, is now Chief, Statistical Design and Computation Section, Facilities Operation Division, Ralph M. Parsons Company, Frederick, Maryland.

Morris B. Ullman, formerly Chief of the Statistical Reports Section, Office of the Assistant Director for Statistical Standards, Bureau of the Census, has transferred to the Office of the Coordinator of International Statistics as Chief of the Foreign Census Research Branch.

William Wolman, formerly with the Naval Inspector of Ordnance, Eastman Kodak Co., Rochester, N. Y., is now head of the Statistical Methodology and Reliability Section, Statistics Branch, Quality Control Division, Bureau of Ordnance, Navy Department, in Washington, D. C.

CHAPTER NOTES

Buffalo-Niagara

The first meeting of the newly formed Buffalo-Niagara Chapter, held March 23, 1955, was attended by some 100 people, approximately 60 of whom were members of the section. Professor W. Edwards Deming of the Graduate School of Business Administration, New York University spoke on "Statistical Theory in the Management of Business and Industry." The main points of his talk were: (1) Industry and business are dependent upon the statistical method and will become more so as time goes on. (2) The executive who is a good manager will have to learn the meaning of variation. (3) Variation must be resolved into that caused by chance and that caused by significant factors. (4) If the executive takes action against chance variation, he creates more disorder than if he had done nothing. If the executive fails to take action against a significant variation he is allowing unnecessary disorder to be a part of his process. In both cases there are errors. (5) The statistical method will provide criteria for rational actions. (6) In summary, good management means the statistical method.

Central New Jersey

At the meeting held at Princeton on March 14th the Chapter had as speaker W. S. Connor, Statistical Consultant, Johnson and Johnson Companies, New Brunswick. Dr. Connor's subject was "Some Statistical Problems Encountered in Industrial Research".

Chicago

A joint dinner meeting with the Chicago Chapter of the American Marketing Association was held on April 28th, at which the speaker was Lothair Teetor, Assistant Secretary of Commerce for Domestic Affairs. Mr. Teetor spoke on "Getting Your Money's Worth from the Department of Commerce", describing the new services which are tailored to current business needs as well as some of the Department's recent surveys.

At the March 17th luncheon meeting Dennis Lindley, Lecturer in Mathematics at Cambridge University, England and temporarily with the Committee on Statistics at the University of Chicago, discussed "Statistical Decision Theory". Joint luncheon meetings with the Chicago Chapter of the American Marketing Association were held on April 7th and May 5th. The speaker at the April meeting was Eli Marks, Senior Study Director at the National Opinion Research Center, whose subject was "Sampling Techniques for Small Surveys". At the May luncheon Philip Hauser, Professor of Sociology at the University of Chicago, spoke on "The Changing Age Distribution of Our Population, and its Implications". The Chapter also held a luncheon meeting on April 21st, at which Irving Schweiger, Associate Professor of Marketing at the University of Chicago, discussed "Application of Consumer Finance Surveys to Business Forecasting".

The Chicago Chapter and the Business Statistics Committee of the Chicago Association of Commerce sponsored, with the cooperation of the Business and Economics Section of the ASA, the American Economic Association, the American Marketing Association, the Chicago Section of the American Society for Quality Control, and the Investment Analysts Society of Chicago, the second annual Midwest Conference on Business Indicators. This conference was held on April 23rd on the Chicago campus of Northwestern University. Sessions were held on measurements of national productive activity – gross national product and industrial production, on indicators of price changes and their analytical and administrative uses, and on major financial indicators of business activity. The luncheon meeting was devoted to a discussion of leading and confirming indicators of general business changes – diffusion indexes.

Cleveland

A joint dinner meeting with the Cleveland Chapter of the American Society for Quality Control was held on March 4th. Miss Besse B. Day and Mr. Francis Del Priore from the Bureau of Ships in the U. S. Navy Department presented a dramatic skit entitled "The Engineer and Statistician CAN Meet".

The skit demonstrated how a statistical experiment was designed and how the results were analyzed to determine the significant lubricating conditions associated with noise in the operation of mechanical gears. A three-by-three Latin square with a split-plot design was used to determine the effect on noise of different levels of temperature, volume, load, speed and direction, and the inter-

action of speed and direction with the other lubricating conditions.

"The Treatment of Statistical Data by Linear Programming" was the subject of Professor William W. Cooper's talk before the Cleveland Chapter at a luncheon meeting on April 26th. Professor Cooper is a faculty member at Carnegie Institute of Technology and is well known for his extensive work in the application of linear programming to industrial problems.

In his talk, Professor Cooper illustrated the fundamentals of linear programming with a problem involving the determination of a maximum-profit production plan. He then explained a novel application to a problem in salary administration. Through the use of linear programming, constrained solutions were possible which would fit a detailed salary classification to known prevailing competitive salary ranges. These constrained solutions, he maintained, could not have been obtained through the use of the traditional least-squares techniques of statistics.

Columbus

At the March meeting, which was held jointly with the Central Ohio Chapter of the American Marketing Association, Dr. Alred N. Watson spoke on "Designing the Sample for Legal Acceptability". The speech was followed by a discussion which dealt with the whole question of standards for the statistical profession—both ethical and technical. The need for work in this field was recognized, as well as the responsibility placed on statisticians by the growing acceptance of the statistical survey in courts of law. Copies of the Budget Bureau's "Standards for Statistical Surveys" have been distributed to the members of the Chapter and use of these standards is being encouraged.

Connecticut

The spring dinner meeting was held in Hartford on May 4th. Mr. Robert C. Oram discussed "Current Developments in Electronic Computers".

Dayton

The Chapter recently conducted a survey of opinions on the question of statistical standards. Questionnaires were sent out to all persons on the mailing list, numbering about 65. Twenty-two responses were received. The results were as follows:

Question A: "What is your attitude toward the formulation by the A.S.A. of technical standards for statistical work?"

Question B: "What is your attitude toward the formulation by the A.S.A. of a code of ethics for statisticians?"

	A: Technical		*B: Ethics*		
Strongly favor	17	77%	14	63%	86%
Mildly favor	3	13	5	23	
Indifferent	1	5	2	9	14%
Mildly oppose	1	5	1	5	
Strongly oppose	0	0	0	0	
	22	100%	22	100%	

Total replies	22	34%
Non-respondents	43	66
Total mailing	65	100%

Denver

A joint dinner meeting with the American Society for Quality Control was held on March 24th. The speaker was Guy G. Parkin, Director of Industrial Statistical Control at the Minnesota Mining and Manufacturing Co. of St. Paul, and a past president of the Iowa Section, A.S.Q.C., as well as a former director of the national society. Mr. Parkin spoke on "Tests of Significance in Industrial Processing", discussing some of the problems encountered in his own company and the methods by which they were attacked.

At the meeting held on April 14th Roland A. Mandat, a former officer of the Denver Chapter and a consulting actuary with the firm of Coates, Herfurth and England, discussed "The Mortality Table as a Mathematical Model". Mr. Mandat pointed out that the use of the mortality table is not limited to actuaries engaged in life insurance work, but with proper modification or correction it may be used to determine life expectancy of materials and equipment. He discussed the various types of tables, the way in which they are constructed, and their usage, and also described the functions of a consulting actuary.

The Denver Chapter is polling its members on the question of whether the A.S.A. should involve itself in the development of statistical standards—both ethical and procedural and technical.

Hawaii

The speaker at the March 18th meeting was Dr. Walter T. Federer, Professor of Biostatistics at Cornell University, visiting principal statistician for the Hawaii Sugar Planters Association Experiment Station, and part-time consultant for the Pineapple Research Institute. Dr. Federer spoke on "Some Problems in Evaluating Consumer Opinion". He pointed out the two avenues of attack on such problems—study under controlled or laboratory conditions using experimental designs, and study under uncontrolled or actual conditions using sample surveys. Any satisfactory method must permit adequate means of isolating the effects of specific variables affecting the volume of consumer purchases, and these effects must be measured under conditions essentially the same as those found in actuality.

A dinner meeting was held on April 22nd at which the speaker was Dr. Bertrand Klass, Manager of Social Science Research for the Stanford Research Institute, and author of numerous articles and reports in the field of social psychology. The subject of Dr. Klass' talk was "Motivation Research in Industry".

University of Illinois

A questionnaire was circulated to members of the Chapter to ascertain attitudes toward the formulation of statistical standards by the A.S.A. The form prepared by Dr. P. J. Rulon was used. Sixteen of the 42 members of the Chapter responded. The results are as follows:

	No. of replies
Do nothing	2
Develop something like the Ten Commandments for statisticians	0
Draw up standards of procedure and technique	4
Go as far as the American Psychological Association	9
Other	1
Total replies	16

The comments may perhaps reveal the attitude of the membership to a greater extent than the questionnaire itself. Comments similar to this were made by several persons: "I am uncertain about how much concern there is, but if anything is to be done in this area, the in-between measures would be inadequate, so do the full job or nothing." One respondent urged that priority be given to technical rather than ethical standards. Another comment seems worth quoting in full: "The chief problems of statistical standards all, in my judgment, arise from ignorance, whether of methods or applied problems. The solution is not legislation but education.

A contribution could be made by the ASA in setting minimum levels of knowledge to be attained by those who call themselves statisticans". Another respondent questions whether ASA should attempt to do the job by itself: "Ethical standards are probably a desirable ideal, but, like the Ten Commandments, would probably emerge to be broken. However, standards of terminology should be striven for, but only if a concerted front is made with all interested parties. Perhaps the Institute of Mathematical Statistics, the American Society for Quality Control, the American Standards Association, etc., could be brought together under the leadership of the U. S. Bureau of Standards or the AAAS. For ASA to go on by itself would be in my opinion futile."

Los Angeles

At the dinner meeting held on March 31st the speaker was Dr. Andrew Comrey of the Department of Psychology, University of California at Los Angeles. Dr. Comrey discussed "Factor Analysis in Psychology." The subject of the April 28th meeting was "The Use of High Speed Electronic Computers in the Field of Educational Statistics." The speaker was James Ziegler, Electronic Computer Division, National Cash Register Co. After the meeting there was a demonstration of some of the company's most recent business machines.

Milwaukee

Miss Bonnie Small, Quality Control Engineer with the Western Electric Co., Allentown, Pa., was the speaker at a joint Ladies Night meeting with the Milwaukee Chapter of the American Society for Quality Control held on February 21st. The meeting was preceded by a dinner at Marquette University. Miss Small's talk, "The Inside Story on Q.C.", was presented in terminology the ladies could understand.

Professor D. V. Lindley, Cambridge University, England, and Visiting Professor at the University of Chicago, spoke to the March 22nd meeting on "Some New Statistical Methods and Theories." The meeting was well attended and Professor Lindley gave an interesting discussion of Statistical Decision.

On May 2nd, the last meeting of the 1954–55 year, Frederick A. Sielass, Manager of the Marketing Department of the Miller Brewing Co., spoke on "Marketing Research at the Miller Brewery." His talk followed a plant and laboratory tour and a dinner at the brewery.

The officers of the Milwaukee Chapter and the Committee on Ethics and Standards of Statisticians report it as their opinion that the ASA should be the authoritative body to determine whether or not an individual is using statistical data in an ethical way. They also believe that subscription to an ASA ethical code should be required as a condition for membership. Insofar as possible the ASA should define the proper qualifications of three types of statisticians: Statistical Clerk, Applied Statistician and Mathematical Statistician.

New York

The Business and Economics Division of the Chapter held a meeting on March 24th at which Arthur Smith, Director of Sales Research Service, spoke on "Marketing Uses of BLS Consumer Income Data by Sales Research Service." The Biostatistics and Social Statistics Divisions met on April 13th. N. T. Wang of the United Nations discussed "International Comparison of Public Social Expenditures"; Lee Herrera and Marion I. Sutcliffe, New York University College of Medicine, reported on "Some Sampling Experiments with a Skew Distribution"; and Frieda Greenstein, New York City Health Department, talked on "Accident or Suicide—Which?".

Oklahoma City and Tulsa

The second annual joint meeting of the Oklahoma City and Tulsa Chapters was held on April 23rd at the University of Oklahoma at Norman. The morning session was devoted to applications of statistics to business problems. Papers were presented by Leslie Brooks, President of Leslie Brooks and Associates, Tulsa; Ray Anthony, Treasurer of C. R. Anthony Co., Oklahoma City; and Dr. Frank Graybill, Associate Professor at Oklahoma A & M College. At the luncheon meeting James Webb, president of the Republic Supply Co. and formerly Director of the Budget and Undersecretary of State, discussed "Coordination of the Statistical Programs of the Federal Government."

Two sessions were held in the afternoon. At the first of these, which dealt with statistics in analysis of human behavior, the speakers were Milton F. Searl of the Stanolind Oil and Gas Co., and Dr. Reed M. Powell, Assistant Professor of Sociology at the University of Oklahoma. The second session was concerned with making population estimates for Oklahoma. Papers were presented by Walter V. Allison of the Bureau of Business Research, University of Oklahoma; Richard W. Poole, Manager, Research Division, Oklahoma City Chamber of Commerce; and Dr. Frank R. Pauly, Research Director of the Tulsa Board of Education.

St. Louis

A joint meeting with the St. Louis Section of the American Society for Quality Control was held on April 15th, at which Guy G. Parkin of the Minnesota Mining and Manufacturing Co., St. Paul, spoke on "Statistical Technique for Forecasting Sales and Liaison with Purchasing, Shipping and Inventory Control." Mr. Parkin discussed his experience in using mathematical programming for these purposes. At the luncheon meeting of May 4th Harry S. Schwartz, head of the Research Department, Federal Reserve Bank of San Francisco, discussed "Some Recent Statistical Problems in Regional Economic Research."

The report of the Chapter's Ad Hoc Committee on Statistical Standards was unanimously approved at the March meeting. This report is as follows:

"The St. Louis Chapter, American Statistical Association, recommends that the National Chapter take steps to establish a code of statistical standards, both ethical and technical. This would include the standardization of notations and symbols used in statistical publications. It was noted that the Federal Government had already taken steps to establish standards for statistical surveys and publications. Dissemination of these standards to statisticians outside Federal service would aid in improving the quality of statistical publications. In order to obtain widespread acceptance of statistical standards, the cooperation of other organizations interested should be enlisted."

San Francisco

The following persons have been elected officers of the Chapter for the year 1955:

President, WINTON PETTIBONE, Standard Oil Co. of California

Vice-President, GEORGE M. KUZNETS, University of California

Secretary-Treasurer, Miss K. PHILLIS BEATTIE, U. S. Bureau of Labor Statistics

State College, Pennsylvania

The following have been elected officers of the State College Chapter, American Statistical Association, for the year 1955:

President, ROBERT E. CLARK
Vice-President, JAMES B. BARTOO
Secretary-Treasurer, ROBERT W. KAUTZ

The principal project of the chapter this past semester has been a compilation of the various offerings in statistics on the campus in an effort to determine the extent of duplication in these courses and also to ascertain what departments are teaching specific topics. In addition, questionnaires have been circulated among departments on the need for a statistical center at the University.

Washington

The March 21st meeting was devoted to the subject, "Statistics as Legal Evidence." The speaker was W. Edwards Deming, Professor of Statistics at New York University. Earl J. Cox, Hearing Examiner, Federal Trade Commission, was the discussant, and Dorothy Morrow Gilford, Statistician, Federal Trade Commission, was chairman of the meeting.

The subject of the meeting held on April 18th was "Sampling Techniques in the Field of Accounting and Management." The speakers were E. T. Magruder, Assistant to Vice-President in Charge of Accounting and Finance, Chesapeake and Potomac Telephone Co., and W. Edwards Deming, Professor of Statistics at New York University and Consultant. The discussant was Marius Farioletti, Planning Division, Internal Revenue Service. The meeting was chaired by B. R. Stauber, Chief, Agricultural Price Statistics Branch, Agricultural Marketing Service.

AVAILABLE NOW

THE AMERICAN STATISTICAL ASSOCIATION

announces publication of two new monographs—

Statistical Problems of the Kinsey Report

by COCHRAN, MOSTELLER and TUKEY. The report of the ASA Committee to advise the National Research Council Committee for Research in the Problems of Sex. 331 pages, in blue buckram. Contents include: Statistical Problems of the Kinsey Report; Appendix A: Discussion of Comments by Selected Technical Reviewers; Appendix B: Comparison With Other Studies; Appendix C: Proposed Further Work; Appendix D: Probability Sampling Considerations; Appendix E: The Interview and The Office as We Saw Them; Appendix F: Desirable Accuracy; Appendix G: Principles of Sampling. *Price:* $3.00 to members of ASA; $5.00 to others.

Proceedings of the Business and Economic Statistics Section.

The Papers Presented by the Business and Economic Statistics Section of the ASA at the 114th Annual Meeting, held in Montreal, Canada, September 10–13, 1954. Sessions were held on: Measuring the Effects of Social Payments on the Economy; The Business Outlook; The Canadian Balance of International Payments; Consumer Survey Data as a Method of Forecasting Economic Fluctuations; Economic Forecasting Techniques I; The Reliability and Meaning of Employment and Unemployment Statistics; Measuring the Effect of Pension Funds on the Economy; Stock Market Forecast; Recent Advances in Government Statistics—Panel; How Good Are Current Statistics for Following Economic Changes?; New Approaches to the Measurement of Saving and Investment; Economic Forecasting Techniques II; Statistics on Mobilization; Determinants of Productivity Levels. *Price:* $2.00 to members; $3.00 to others.

Copies of both publications may be ordered directly from

The American Statistical Association, 1108 Sixteenth St., N.W., Washington 6, D. C.

Important McGRAW-HILL *Books*

STATISTICS FOR ECONOMICS AND BUSINESS

By DONALD W. PADEN, University of Illinois; and E. F. LINDQUIST
State University of Iowa, 270 pages, $4.00

An elementary college text for students of economics of business administration. This book provides the student with a basic understanding of the more important statistical techniques required for intelligent reading, research, or activity in the business world. A reasonably brief, non-technical interpretation of the common statistical tools currently in use in business and economics is provided. Computation and mathematical manipulation are held to a minimum. The text and a manual are prepared to be used together to encourage the student to formulate for himself the uses, limitations, and important properties of each statistical technique considered.

ELEMENTARY STATISTICS

For Students of Social Science and Business

By R. CLAY SPROWLS, University of California, Los Angeles. *In press*

A basic, elementary text for all social science and liberal arts students. It deals primarily with the formulation of decisions based upon incomplete information. It considers statistics important as inference, not description. Emphasis is on principles of inference, the ideas of hypotheses, risks of error, and the evaluation of these risks in terms of the operating characteristics of a statistical test. Also included is the treatment of a time series as a stochastic or random variable and the employment of some statistical tests for the detection of systematic components before estimating them.

BASIC STATISTICAL CONCEPTS

By JOE K. ADAMS, Bryn Mawr College. *In press*

A new book which develops some basic mathematico-logical concepts of statistics. It provides an understanding of the language used in mathematical statistics, including the language of elementary calculus. The logic of statistical inference is presented using finite populations, making it possible for the beginning student to work through the basic concepts without skipping any of the mathematics involved. Also included are the most frequently used mathematical models, both discrete and continuous with numerous applications.

A PRIMER OF SOCIAL STATISTICS

By SANFORD M. DORNBUSCH and CALVIN F. SCHMID,
University of Washington. *In press*

Covers the basic subject matter of statistics, requiring only a background of elementary arithmetic. All basic, essential statistical concepts and techniques are covered. Mathematical concepts and formulas are presented simply wherever necessary and in such a manner as to make their significance and utility immediately apparent. Graphic materials of exceptional quality and interest are interwoven in the text to provide concrete illustrations for theoretical discussions.

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NEW ROCHESTER, N. Y. CHAPTER

The Board of Directors recently granted a charter to the new Rochester, N. Y. Chapter. On April 5, 1955 an organization meeting was held and the following officers were elected:

President: Richard A. Freund, Eastman Kodak Co.

Vice-President: Harry A. Weitzman, Rochester Gas & Electric Co.

Secretary-Treasurer: J. Edward Jackson, Eastman Kodak Co.

For information regarding meetings and other activities of the chapter, please contact Mr. Jackson or Mr. Freund at the Eastman Kodak Co. in Rochester, N. Y.

CONTRIBUTED PAPERS SESSIONS FOR 1955 ANNUAL MEETING

Members of the American Statistical Association and their guests are invited to submit papers for the Contributed Papers Sessions to be held at the 1955 Annual Meetings in New York City, December 27–30.

One session will be devoted to papers of interest to the **Business and Economic and the Social Statistics Sections.** A second session will include papers of interest to the **Biometric and the Physical and Engineering Sciences Sections.** Papers on **Training** can be submitted to either session.

The papers may be concerned with pure statistical methodology or the findings of statistical studies or anything in between. They should be limited to ten minutes of speaking time, or about five double-spaced typed sheets. Each should be accompanied by an abstract of not less than 100 words. If it is desired that only the title be read, then the paper should be so designated and only the abstract need be submitted. Final deadline for submission of papers is September 15, 1955.

Papers on **Business, Economic or Social Statistics** should be sent to one of the following: *Dr. Clarence D. Long, Johns Hopkins University, Baltimore, Md.; Dr. A. J. Jaffe, Bureau of Applied Social Research, Columbia University, New York 27, N. Y.; Dr. S. L. Wolfbein, U. S. Bureau of Labor Statistics, U. S. Dept. of Labor, Washington 25, D. C.* Papers on **Biometrics and Physical and Engineering Sciences** should be sent to *Dr. Boyd Harshbarger, Head, Dept. of Statistics, Virginia Polytechnic Institute, Blacksburg, Va.*

We are especially interested in obtaining papers from statistical students and younger members of the Association. Members who are teachers or supervise junior personnel are urged to call this notice to the attention of their students or assistants. Copies of this notice for posting on bulletin boards can be obtained from the Secretary of the Association.

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Periodicals Div.,
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Detroit 2, Mich.

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